TMF

October 1988

THE MAC FLYER-For Greater Safety in MAC Air Operations

437th MILITARY AIRLIFT WING

All about Charleston AFB . . . page 16

TMF

THE MAC FLYER - For Greater Safety in MAC Air Operations

October 1988 MACSP 127-5 VOL XXXV NO. 10

page 14

page 16

FEATURES

3 Where Did The Time Go?
Sharpen 'them pencils' one more time.

4 AFSOC Procedures and Techniques
Exchange, improve, and polish.

14 Near Mishaps . . . .
Mac MacKenzie rides a wild King Air.

16 Charleston AFB, The 437th Military Airlift Wing
MAC folks on the job in the Old South.

20 On Top Of The World
Another sure recipe for *"trouble."*

23 12 Hours Bottle To Throttle
Understand the residual effects of alcohol.

DEPARTMENTS

10 Mishap With A Moral
28 Flying-Hour Milestones
30 Quickstoppers
31 After Deadlines

Gen. Duane H. Cassidy — Commander in Chief
Brig. Gen. Floyd E. Hargrove — Inspector General
Col. Thomas M. James — Director of Safety

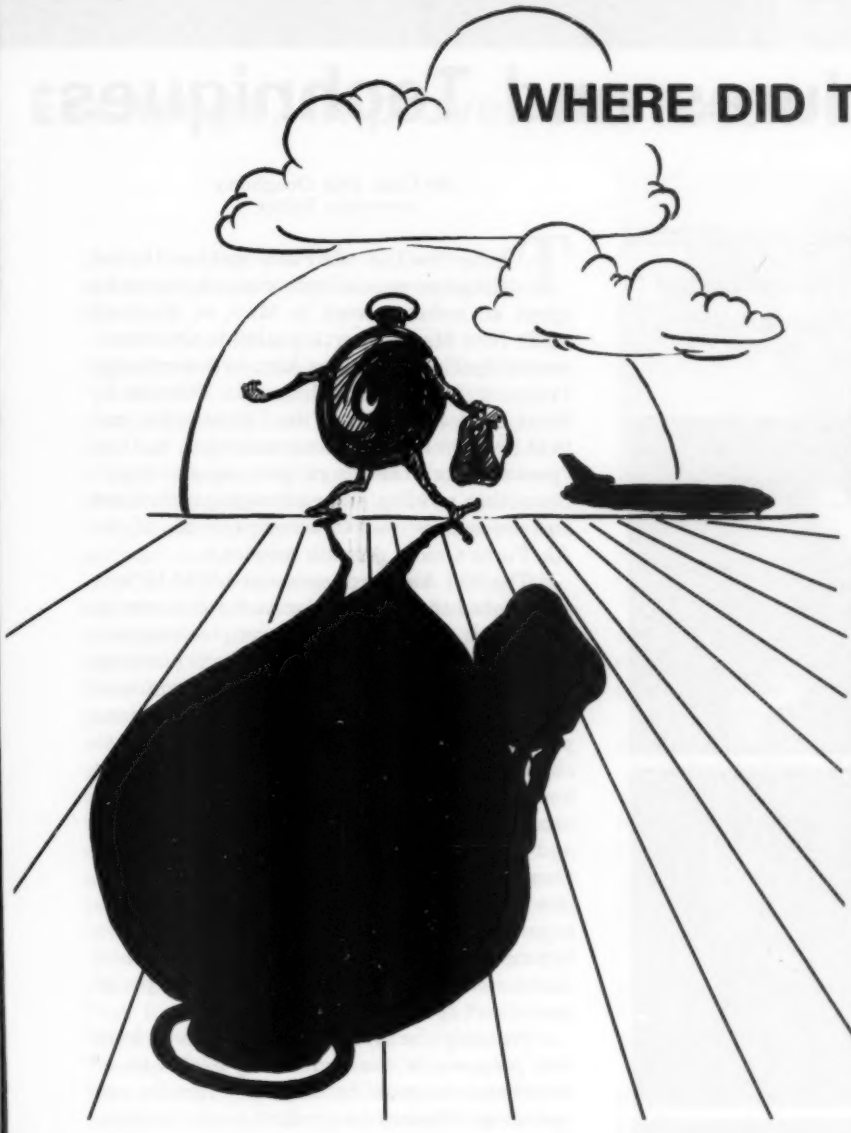
Maj. Thomas C. Weinzierl — Supervising Editor
Maj. Stephens F. McCauley — Associate Editor
Capt. Daniel T. Dougherty — Associate Editor
Mrs. Frances A. Caldwell — Writer/Editor
Mr. Tommy F. O'Laughlin — Art Director

The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

Contributions, comments, and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, IL 62225-5101, Autovon 576-3534 or area code 618-256-3534. The editors reserve the right to make any editorial changes in manuscripts which they believe will improve the material without altering the intended meaning.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes of address for subscriptions mailing should be sent to GPO. Give both old and new addresses, including zip codes. USAF Active and Air Reserve Forces units establish requirements for the magazine through their publication distributor (DAPD). Other U.S. Military units should consult administrative directives. *The MAC Flyer* is published at an approximate ratio of one magazine for every five MAC aircrew members, and one for every twenty MAC Support personnel. Distribution X: OPR: HQ MAC/IGFE ISSN 0024-788X.

WHERE DID THE TIME GO?



Already? you ask. It can't be! you say. Oh, come on, it's not possible! you exclaim.

Yes; it is; and it's possible; we answer.

That very special time of year has come around once again. It's time for *"THE 1989 MAC FLIGHT SAFETY WRITING CONTEST."*

We need your entries—give us your thoughts, your safety philosophy, and your experiences. Your entry, if selected, will be shared by over tens of thousands of readers all over the world. You'll also receive a desk set (first through third place) or a plaque (honorable mention).

You can't lose. If your entry is not selected for publication, you still win—a one-year complimentary subscription to *TMF*, that is. So, don't hesitate. Start right now and be one of the first to enter. Follow the rules below.

THE RULES

The 1989 MAC Flight Safety Writing Contest is conducted according to MACR 900-3 and these rules. Entries must be original, unpublished, *contain an aviation safety/mishap prevention message*, and be postmarked no later than 31 March 1989. Stories must be between 1,000 and 3,000 words long (approximately 6 to 14 double-spaced typed pages). Poetry should average 75 to 100 lines. Manuscripts must be typed, double-spaced, and submitted in two copies. Identify entries by title only and attach a cover sheet indicating author's name, address, duty phone, unit and home address. Please include a brief autobiography.

The contest is open to all. Entries qualifying under the above rules earn their author a complimentary one-year subscription to *TMF*. However, desk sets and plaques may be awarded only to military members and civilian employees of the Department of the Air Force and Air Reserve Components. Other entries may be selected for Honorable Mention in a special category.

Winning entries will be published in *TMF*. Submit to:

MAC Flight Safety Writing Contest
HQ MAC/IGFE
Scott AFB, Illinois 62225-5101

AFSOC Procedures and Techniques:

Special Operations Aircrew Interchange Program provides quality opportunity for crews to compare notes.

By Capt. Dan Dougherty
Associate Editor

Maj. Gen. Patterson

Gen. Cassidy, CINCMAC/CC;
Sir Harding, Air Marshall, RAF;
Brig. Gen. Scott, SOAIP
Mission Commander

Gen. Lindsay, CINCSOC/CC

Photo by Sgt. Dawne Rios

Thirty-five U.S. Air Force and one United Kingdom special operations flying units spent an arduous week in May, at Kirtland AFB, New Mexico, participating in the fourth annual Special Operations Aircrew Interchange Program (SOAIP). As Brig. Gen. Hanson L. Scott, 23d Air Force Vice Commander and SOAIP 1988 mission commander put it, they "packed more meetings per square hour" discussing, refining, and exchanging techniques and procedures used to accomplish one of the Air Force's most delicate missions.

The 23d Air Force-sponsored SOAIP was established to provide a forum for aircrews to exchange special operations techniques, procedures, threat analysis, and flight planning methods. The SOAIP identifies common aircrew concerns about special operations procedures and increases our integral combat capability. The first fixed wing SOAIP was hosted by the 2d Air Division in 1986. This occasion marked the first combination of fixed and rotary wing assets. In CINCMAC's (Gen. Duane H. Cassidy) words: "This unique forum lets fixed and rotary wing aircrews share experiences, exchange concepts, and preserve lessons-learned. It is the opportunity to see and discuss techniques employed across the special operations spectrum."

Probably the greatest benefit derived from this program is the continuing exchange of knowledge. It would be very, very rare for one special ops element to conduct a solo mission. The nature of the mission demands extremely specialized individuals combine their skills and act as one. The airpower arm is only one of the joint air, ground, sea, and command and control elements affecting mission success.

However, airpower, by itself, is also a combination of specialists operating unique equipment in a very demanding environment. It is imperative that members comprising the airpower side learn each other's capabilities. This knowledge establishes one of the most important factors of this mission—predictability. The helicopter crew believes the tanker will be there, on-time, ready to pass gas.

Exchange, Improve, and Polish

Or, the Starlifter crew believes the combat control team is in place and has prepared the landing zone.

Predictability is paramount in this business, and it's not easily earned. To become "predictable," you must demonstrate your knowledge, skill, and trustworthiness. Sound like the Boy Scout Law? If it does, the comparison stops with the verbiage because this is no summer camp—it's life or death, do it right during the only shot you have—our national image is on the line.

The place to earn it is not during the mission. Joint exercises are good, but rarely do all airpower players converge for the same exercise. When several do, they usually operate from distant bases, missing the all important personal interface that leads to trust. The solution—SOAIP. This is the airpower element's exercise. Scenarios are canned and somewhat simple considering these units' unique capabilities; the mission here is not necessarily troops on target—it's establishing and enhancing predictability. The five and one half day program was extremely well organized towards this mission's accomplishment.

The event began with opening remarks by the Air Force's special operations leader, Maj. Gen. Robert B. Patterson. General Patterson fills two unique, full time jobs: Commander, Twenty Third Air Force; and Commander, Air Force Special Operations Command (AFSOC) commanding the air power arm of the joint operations of the Special Operations Command.

General Patterson set the tone for this unique program by challenging the aircrews to "learn, participate, and exchange information." His enthusiasm for the program was most sincere and quite contagious.

Special ops and C-130s are not new to General Patterson. After his tenure as 463d Tactical Airlift Wing Commander, he became Vice Commander, 21st Air Force. As such, he commanded the airlift forces that invaded Grenada. His respect for multifunction coordination in both joint and special operations was earned under fire, and his desire to unify

Route Planning is tedious, exacting work.

purpose was clearly evident at this gathering. His welcome letter spoke of his philosophy, "History has taught us we must learn from our mistakes . . . Today, we are faced with the challenges of tactically employing old weapons systems in a very sophisticated environment . . . Be innovative in your ideas and keep safety foremost in your thoughts."

Following General Patterson's remarks and necessary administrative announcements, the interchange began with a social. There's no escaping the fact that aircrews exchange information most effectively in this environment, and wandering around the room, I can attest to it.

The next two days were spent in an auditorium where our mission commander, General Scott, focused our attention on our purpose for being here: "There's a lot of

Air Force Special Operations Assets

MC-130E Combat Talon Concept of Operations

Capable of worldwide, long-range penetration into politically denied/sensitive areas to infiltrate, resupply, or exfiltrate (by airland or Fulton surface-to-air-recovery system) forces during adverse weather conditions, day or night.

Photo by Capt. Dan Dougherty

When the crew develops their plan, the mission commander gets a full briefing.

expertise here—and it's a team effort. There is no *'they'* here, every problem is *our problem; every issue is our* issue." General Scott emphasized the importance of participating with the goal of finding the better way to do it, the most effective way.

Of particular interest was the safety briefing given by 23d Air Force Director of Safety, Col. John K. Tatom. He explained his philosophy concerning the word itself. He warned the crews to be wary of the word "safety." By itself, it's relatively harmless, but it inspires aircrews to turn down the volume on their receivers, expecting only more preaching, do's and don'ts, and "We'll nail you if you do." Instead, Colonel Tatom recommended we insert the word "common sense." In his words, "Safety is a measure of how well we've done the job—it's common sense. You've got good equipment, good people—know your limitations, your aircraft's, and your crew's. Remain within them, and you'll be safe."

After some more administrative remarks, it was as if someone had fired a starting gun—they got down to the business at hand. We started with informational briefings designed to get us all on the same sheet of music. Besides an overview of special operations given by the USAF Special Operations School, the MAC Combat Aircrew Training School provided useful, if not eye-opening, information on current threats and lessons learned. Then the fixed and rotary-wing aircrews were separated to get aircraft-specific briefings on maneuvering against the air threat. Both were taught by faculty members from the Advanced Airlift Tactics Training Center and the Marine Air Wing Tactics School.

What followed were capability briefings from various participants, tactics updates, and static aircraft displays. Several defense contractors also set up displays in the hangar. One in particular was quite impressive. Take satellite imagery and apply some of the most cosmic computer wizardry—result—a video panorama of what the pilot can expect to see from his aircraft. The capability is absolutely amazing and its uses are tailor-made for this mission. An aircrew, with the use of a visual simulator, can rehearse an entire low altitude profile mission. The computer is capable of inserting gun emplacements, targets, and other threats.

The meat of the program occurred during the next few days. Certain participating units brought one or two aircraft, crews to fly them, and other aircrews to observe. It sounds confusing, but the concept was quite effective. Each craft and crew was given a mission for each of two night-flying periods. The observers were then allowed to join the crews as they went through their normal planning process and then actually fly with those same crews during mission execution.

continued on page 8

AC-130A/H Spectre Gunship Concept of Operations

Capable of supporting worldwide long-range missions. Specifically, by use of visual and electronic sensors, the AC-130 precisely delivers munitions in support of unconventional warfare, collective security, convoy escort, helicopter escort, and search and rescue. In an offensive role, the gunship provides close air support, interdiction, and armed reconnaissance. The AC-130U Gunship Program will replace 10 aging AC-130As by modifying 12 new production C-130Hs to gunship configuration. Objective: field the new U model by FY '92.

HC-130 Concept of Operations in the Special Operations Role

Capable of conducting day/night clandestine formation/single-ship intrusion of hostile territory to provide aerial refueling for helicopter operations, and may also be required to perform clandestine aerial delivery or airland of personnel and equipment.

No Strings, No Mirrors—Just Guts

By Col. George F. Shipp
Assistant Deputy Commander for Special Operations
317th Tactical Airlift Wing
Pope AFB, North Carolina

As the C-130 skims along its low-level route at two in the morning, the quiet is broken by a cryptic message received over the SATCOM radio, "This is Tiger One Niner, Lisa at Zero Six Zero Zero." The radio operator passes to the aircraft commander and the troops in the back of the aircraft, "Tiger 19 passes, AIRLAND OPTION, AIRLAND OPTION." The navigator readjusts his timing to put wheels down on the blacked-out runway at exactly 0236 hours. If he's more than two or three seconds off his timing on touchdown (that's two or three seconds!), he'll get razzed at the mission hot wash (debrief). If he's more than 30 seconds off, he'll have to abort his landing attempt and the mission will be in jeopardy.

It's the job of the "map nav" and the "radar nav" to get there at precisely the right time. The "safety pilot" and copilot assist the navs in locating terrain features using night vision goggles, unless they're in weather, in which case they're on their own. When they get to the objective field, the "left seater" has it. Listening to altitude and airspeed called out to him, he lands his totally blacked-out aircraft on a totally blacked-out field.

Again, the radio operator transmits on SATCOM: "Tiger One Niner, Ticker Two Two is Mary at Zero Two Three Six." They've landed at the objective on time—the mission progresses as scheduled. One thing is noticeably lacking as the aircraft taxis to a stop, there are no big sighs of *relief*, no one says, "We've made it." The general feeling is that no one doubted they would! They've done it many times before, and they'll continue to taxi to a stop at precisely the right place, at precisely the right time, without a speck of light.

This is one of Pope's Special Operations Low Level (SOLL II) crews. This profile is designed to deliver men and equipment in the enemy's midst using terrain to hide the aircraft from enemy radar and lack of light to provide the element of surprise.

Each of Pope's three operational squadrons are capable of deploying these eight-man SOLL II crews. One of the wing's operations divisions, DOS, manages the special training for these crews. A nine-man, crack maintenance team in "Special Electronics" provides the unique aircraft configuration and gives special attention to fixing broken systems. When not involved in getting an aircraft airborne, they are busy designing better cockpit lighting systems and instrument configurations to improve mission performance.

What draws crewmembers to SOLL II? They're already qualified and flying AWADS, formation, assault landings, etc., etc. Furthermore, they don't get any relief from standard flying rules and regulations. For example, blacked-out landings are authorized only in precoordinated reserved restricted areas. The answer is simple—*challenge!*

SOLL II missions are some of the most challenging airlift missions in MAC. Literally, days are spent in flight planning and coordination. It isn't magic or luck that the rubber hits the runway at precisely the right second. It's many hours of studying charts, drawing lines, and "what-if-ing" every possible contingency. It's also that extra tender loving care the maintenance team gives mission aircraft.

When you get ready to fly a SOLL II mission, and slap on your SOLL II patch, which says "NO STRINGS, NO MIRRORS, JUST GUTS," (and hard work, I might add), you feel good knowing you're flying with some of the most professional crewmembers in the Air Force.

317 TAW SOLL II crews practice meticulous planning.

C-130 SOLL II Concept of Operations

The C-130 Adverse Weather Aerial Delivery System (AWADS) SOLL II aircraft augment SOF in the contingency and crisis response role. Conducts clandestine formation/single-ship intrusion of hostile territory providing highly reliable, self-contained, precision airdrop/airland of personnel and equipment. The mission is conducted day/night, low-level, in adverse weather without use of external aids. The slick C-130 is capable of heavier payloads than the Talon and provides a worldwide signature, better allowing tactical deception.

C-141 SOLL II Concept of Operations

Similar to the C-130 SOLL II, the C-141 is also required to conduct clandestine formation/single-ship intrusion of hostile territory providing highly reliable, self-contained, precision airdrop/airland of personnel and equipment. The mission is conducted day/night, low-level, in adverse weather without use of external aids. The C-141 is well suited for this application due to its large load capacity and ability to operate into prepared austere landing areas, as well as having a worldwide signature.

"The Hot Wash." At mission's end, all aspects are thrown on the table for discussion.

This is where the "real" interchange took place. Most would readily agree that the flying portion of a SOF mission would be unique. Night low-level profiles and blacked-out landings are not at all normal airlift activities. But planning, the way they do it, is also a unique, and even arduous task taken very seriously by these crews. Quoting from the official AFSOC Mission Planning Guide, the

Combat Tactics in the MAC Mainstream

By Lt. Col. Bruce Balbin
Chief, Combat Tactics Division
Headquarters, Military Airlift Command
Scott AFB, Illinois

The Military Airlift Command's tactical role has experienced an explosive growth in recent years. The Air-Land Battle concept demands highly mobile, deep penetrating forces. Highly mobile equates to travel light, travel fast, and hit hard. To do so, Army forces will not be as concentrated, yet will experience exceptionally high consumption and attrition. To support this activity, MAC will airlift more emergency supplies to many smaller and more mobile forces.

Deep penetration into enemy territory will always carry a high risk, and flight near the forward line of troops will also present extreme hazards which demand aggressive defensive tactics. MAC aircraft, except for a few SOF C-130s and helicopters, have no defensive systems—they are simply not designed for self defense. Tactical exercises continually prove the need for survivable airlift tactics which include operating in the 300-to 500-ft altitude range.

Folks in HQ MAC's combat tactics and training directorates are working together to enhance tactical training to better prepare airlift forces "to train the way we will fight." Maj. Gen. James D. Kellim, MAC's Deputy Chief of Staff for Operations, convened a MAC Combat Tactical Training Tiger Team at Scott AFB last November. He challenged the experts from the field to assess the way MAC trains and review what's needed to go to war. Some of the team's initiatives were to rewrite MACRs 55-130 and 55-141, to emphasize imaginative, survivable en route tactics, delayed slowdowns, and random run-in procedures. Combat aircrew training is MAC's primary goal. To insure this, combat aircrew training will eventually become part of initial and continuation training for all MAC crews, not just those currently tactically qualified.

In the future, MAC crews will experience more tactical training, including low level tactics, taught in formal schools. Further JA/ATT program revisions will emphasize flexibility through point system adjustments to encourage and allow aircrews to pick the most survivable method to deliver the goods.

Crews will be trained to a much higher knowledge level in threat analysis and avoidance, with the MAC intelligence community taking a greater training role.

Several airdrop improvement initiatives are either underway or on the drawing board to improve airdrop capabilities. These include:

- **C-130 Self-Contained Navigation Systems (SCNS)** - Will provide precise aircraft position and steering information without the need for external navigational aids. The system interfaces with airborne radar on All Weather Aerial Delivery Systems (AWADS) aircraft to provide a precision IMC airdrop capability.
- **Container Delivery System Accuracy Enhancements** - Includes air drops at lower altitudes (400 ft), adopting visual sight angle drop methods, and fielding better equipment for bundle release.
- **Minimum Drop Zone Marking Test** - Only the point-of-impact will be marked by ground forces using what is known as a raised angle marker (RAM). Results thus far indicate the RAM is a much better marking than we've ever had.

Finally, newly written MAC 55-XX regulations (in coordination) will incorporate new and improved tactical procedures, and place much more decision making authority and mission planning and execution responsibility on mission commanders.

(Editor's comment: For Colonel Balbin's full story on this subject, see "Airlift, A New Awakening" in the Summer 1988 issue of *Airlift*.)

MH-53H PAVE LOW Concept of Operations

Capable of precise low-altitude navigation, effective terrain masking, and day/night penetration to airland/airdrop people and equipment. Given accurate coordinates and system updates, the navigation system is accurate to plus or minus 60 feet. With aerial refueling, the PAVE LOW is range limited only by crew endurance.

HH-53 Super Jolly Green Giant Concept of Operations

The Jolly Green's tactics are varied and dependent upon crew endurance and threat considerations. Major differences from PAVE LOW configuration are in navigation and terrain following systems, yet it is also capable of day/night penetration to airland/airdrop people and equipment and aerial refueling. Currently, all HH-53 Jolly Greens are programmed for PAVE LOW conversion by FY '90, and all H-53s are scheduled for an aggressive service life extension program.

introduction to special operations planning tells the story:

Special Operations Planning

Special operations planning is a form of military judo—not a gentleman's game. In its simplest terms, it involves three steps: (1) Get there; (2) Do it; (3) Get back. It seldom involves seizing or holding territory. The missions are characterized by:

1. **High risk/high gain.**
2. **Intelligence driven and dependent.**
3. **Limited number of participants.**
4. **Often doing something that hasn't been done before.**
5. **Use of latest state of operational and technological art.**
6. **Complexity.**

Mission emphasis is on the following principles:

1. **Surprise.**
2. **Security.**
3. **Intelligence.**
4. **Speed/mobility.**
5. **Timing.**
6. **Coordinated teamwork.**
7. **Maximum delegation of authority.**

Requirements:

1. **Elite force with multiple capabilities.**
2. **Security, cover, and deception.**
3. **Secure and redundant communications.**
4. **Special equipment and procedures.**

The lists are incomplete, but if you can perceive these characteristics, principles, and requirements as somewhat peculiar to special operations, then you can begin to interpolate some of the peculiarities of special ops planning.

After the flight course is planned, plotted, and computed, one of the last things done is to list, brief, and rehearse the entire mission and all events. This sequence even includes calls to clearance delivery.

I literally could not have copied every conversation that went like, "Why do you do that . . . I see . . . ." Or, "We do something similar . . . have you tried . . . .?"

Through it all, prebriefing, flight, and postflight briefing, four important leaders were present; General Scott; Colonel Flournoy, 23 AF/DO; Colonel Kimsey, 23 AF/DOX and Colonel Tatom. On the final day, they all got together for the grand hoorah. The special ops term for it is "hot wash."

The hot wash may not be what you're thinking. Some crews become quite adamant when something out of their control goes wrong. However, this is where mistakes are corrected, procedures changed and most importantly, predictability established.

While changes are always slow, past SOAIPs have led to major changes in chart preparation procedures and publication of 23d AF Reg 55-4, Electronic Combat. The results of this year's effective interchange may include lower night en route altitudes, more proficiency training, standard night zone markings, cockpit lighting, and defensive electronic systems. Even if these initiatives aren't in effect before SOAIP '89, these crews will be much more effective because they were here. Trust and predictability were established, they've discussed deviations and how to manage them—they'll know what to do.

MH-60 PAVE HAWK Concept of Operations

The MH-60 is capable of clandestine, covert, formation/single-ship penetration to airland/airdrop people or equipment. Range is extended by aerial refueling capability.

(Author's Note: Other Air Force aircraft are on call to augment SOF operations in roles not requiring clandestine/covert penetration capability yet are heavily involved in the special ops role. These include a few remaining UH-1Ns and HH-3s, and the C-5B. In the future, SOF acquisitions include the CV-22 with six aircraft Initial Operational Capability by late FY '94. Another interim aircraft acquisition under consideration is the C-27 STOLL. This aircraft will fill the lift/range capability void between the C-130 and PAVE LOW helicopter. However, the program is currently unfunded.

We must all avoid . . .

Breakdowns

Flying airplanes is an inherently risky endeavor. As in any high-risk occupation, it requires sound physical capabilities, good judgment, and nearly absolute compliance with prescribed procedures and operating standards. A breakdown in any of those areas can have disastrous results, as this commuter's crew found on 26 May 1987.

On that date, Air New Orleans, doing business as Continental Express Flight 962, departed New Orleans International Runway 19 at 1645 CDT on a scheduled commuter flight to Eglin Air Force Base, Florida. There were two pilots and nine passengers on board N331CY, a British Aerospace BAe-3101 (Jetstream 31) twin turboprop. As the airplane reached an altitude of 150 to 200 ft, the crew felt a severe yawing motion and observed both engine torques fluctuate erratically. The captain made an emergency landing on Runway 19's departure overrun. Following one bounce and final touchdown, he applied maximum braking and reverse thrust. The airplane rolled off the overrun, across an airport access road, through an airport security fence and concrete highway barrier, and across the highway. The airplane struck several vehicles on the roadway during the accident sequence. The main wreckage came to rest in a parking lot. Two passengers aboard the airplane suffered serious injuries. Both pilots, seven passengers, and two occupants of ground

vehicles sustained minor injuries. The crew and passengers evacuated safely. There was no fire. The airplane was destroyed.

Flight History

Flight 961 departed Eglin Air Force Base at 1500 and landed at New Orleans International at 1600. According to the pilots, all aspects of this flight, including an engine trend monitor check at altitude, were uneventful.

The flightcrew reported turnaround activities at New Orleans for Flight 962, routine. The captain added he didn't feel rushed in any way. He remained in the airplane during turnaround activities performing weight and balance calculations while the copilot monitored fueling and cargo loading.

The flight received taxi clearance and taxied from gate 14B, on time, at 1635. The crew stated all taxi checklist items were performed in a routine manner using a challenge and response format.

At 1643:18, the tower controller advised Flight 962 to "Be ready for an immediate (takeoff)." A Transtar MD-80 was then cleared to take off on Runway 19. At 1643:40, the controller cleared the mishap aircraft onto Runway 19 and further instructed to "Be ready to roll as soon as the Transtar Nine rotates." At 1643:59, the tower stated, "Nine sixty two, be up on power, be ready to go, after departure, be runway heading." The airplane was cleared for takeoff at 1644:03 with the captain at the controls.

Because of tower instructions to be ready for an immediate takeoff, the captain stated he advanced the engine RPM levers as he was taxiing into position on the runway. He said he specifically recalled advancing the RPM levers and watching engine RPM indications "come up to a hundred percent." He also stated the RPM friction lever did not feel loose. The first officer agreed the captain advanced the RPM levers full forward, but did not recall seeing 100 percent RPM indications. He said, "He grabbed the speed (RPM) levers because normally I would have done it and so it was a difference, and, you know, it kind of stuck (in my mind)."

The pilot stated the first portion of takeoff was routine. The captain specifically remembered the first officer made the torque and "airspeed alive" callouts. The torque callout was a result of the engines reaching target torque—in this case 96.4 percent. The captain believed the airplane became airborne after a ground roll of approximately 3,500 feet. He also stated initial climb and gear retraction were uneventful to a point approximately 200 ft above ground level. At this juncture, engine torque gauges began fluctuating erratically and the airplane began yawing back and forth. According to the first officer, no other unusual engine guage fluctuations were noticed. The captain first believed he was in the middle of a wake turbulence encounter, but quickly dismissed the idea because he could detect only yaw with no rolling motions involved. He then thought the torque temperature limiting (TTL) system may have been bypassing fuel to the engines—a situation he knew could occur when the engine power levers are advanced too far forward. He then slightly decreased power settings on both engines, which resulted in even greater torque oscillations and greater yawing.

At this point, the captain believed both engines were malfunctioning for some unknown reason, and further flight was impossible. He also stated he was running out of time to diagnose his problem and had to get the airplane back on the ground immediately.

[redacted]

"... the pilots rushed their pre-takeoff duties to comply ...."

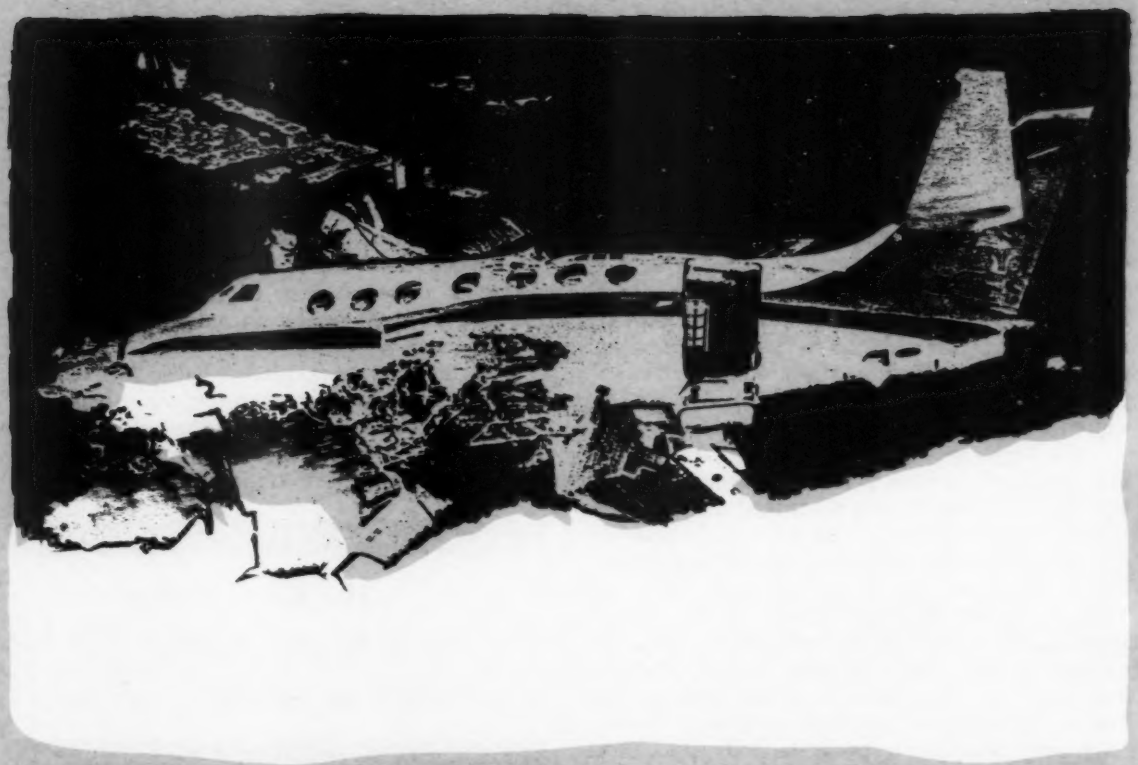
[redacted]

He initially considered landing on or near Runway 28 and made a slight turn in that direction, but immediately realized he could not complete the 90 degree right turn required. He then pulled the power levers to flight idle, nosed the airplane down, and lowered the landing gear for a landing on Runway 19. He stated that just after touchdown, he applied full reverse thrust and full braking. He remembered rolling through the chain link fence, pulling on the yoke as he approached the concrete highway divider, the heavy impact as the airplane struck the divider, and the subsequent final cessation of foward motion.

Analysis

The National Transportation Safety Board (NTSB) investigated this accident and focused its attention on engine performance and cause of reported engine fluctuations.

Ground runs and flight tests performed by British Aerospace engineers clearly showed that engine instability (power oscillations) can be induced through mishandling of engine power and/or RPM levers on the Jetstream 31. The instability experienced during the tests matched and probably exceeded that described by the crew. The tests proved that instability can be induced by either



setting RPM in the range from minimum propeller governing RPM to low inflight RPM and advancing engine power levers far enough to invoke either the torque or the temperature limiting function of the TTL system or, reducing engine speed by retarding RPM levers out of approximately 100 percent with the engine power lever fully advanced.

The Safety Board, therefore, believed that if the crew attempted a takeoff with RPM levers below the 100 percent takeoff setting and the TTL system was activated for any reason (either overtorque or overtemperature), then severe engine power fluctuations would probably result sometime in the first few moments of high power requirement.

With the reported temperature of 86 degrees Fahrenheit, the engine would be temperature limited, rather than torque limited. With the RPM lever set below 100 percent, as airspeed increased during takeoff and initial climb, the propeller blade angle would be increased by the propeller governor to maintain the RPM selected by the RPM lever. In order to support that engine speed at higher blade angles, the fuel control would gradually increase fuel flow to the engine until at some point exhaust gas temperature would exceed temperature limits and cause the TTL to bypass fuel. This fuel bypassing initiated the power fluctuations.

Activation of the TTL is a normal, protective function of the fuel control system for this engine installation and is not an abnormal condition. Therefore, the Board believed the flightcrew failed to advance the RPM levers to the full-forward (100 percent) takeoff setting before attempting takeoff.

The 3,500-ft takeoff roll reported by the captain, and subsequent flight test results, are consistent with a takeoff attempted with the RPM levers not in the full-forward position. Although the flightcrew indicated engine RPM levers were advanced immediately before takeoff while the airplane was taxiing into takeoff position, the preponderance of evidence indicates they were either advanced to a position less than full forward or were not advanced at all. Because the Board believed the flightcrew's failure to advance RPM levers was unintentional, they examined other conditions and circumstances of the flight to determine if any of them may have contributed to this oversight.

One circumstance considered was the possible adverse effect of the flightcrew's interaction with the air traffic controller and the possibility the pilots rushed their pretakeoff duties to comply with instructions for an immediate takeoff. The controller's comments may have induced such a sense of urgency in the pilots that they rushed checklist

completion and predeparture tasks. However, about 47 seconds elapsed from the time the flight notified the controller it was ready to depart and issuance of the departure clearance. Also, the pilots testified they had completed the checklist before reaching the runway hold line, with the exception of the last item—advancing the RPM levers.

The captain further stated he personally advanced RPM levers, rather than the first officer, even though company procedures require the nonflying pilot to advance RPM levers. Interestingly, the captain stated his action was precipitated by the controller's instructions to be ready for an immediate takeoff. He also stated that all checklist items were completed and the airplane was on the runway at a stop before receiving takeoff clearance.

It is apparent, however, that all checklist items were not completed in that the RPM levers were not advanced to the takeoff position. A policy of strict adherence to checklists not only includes fully complying with each item on the checklist, but also includes having the proper crewmember comply with each item. *Having a crewmember shortcut a checklist by doing things assigned to another crewmember, however well-intentioned the reason, can lead to error.* This is especially true when the crewmember using the checklist is not familiar with it or the aircraft.

Lack of familiarity with the aircraft was also cited as a possible cause by the Board. At the time of the accident, the captain had only accumulated about 47 hours in the Jetstream 31, excluding 15 hours training time. The first officer had less than 15 hours, excluding 4 hours training, and had completed a competency check only one week before the accident. Both pilots had extensive recent experience in the Beech BE-99, another twin-engined turboprop airplane with different takeoff power-setting procedures. Given the crew's inexperience in the Jetstream 31, it is logical to conclude that when they experienced even mild stress or apprehension, they may have reverted back to recent habit patterns and began takeoff believing the RPM levers had already been properly positioned.

This aspect was especially true for the captain because it was not his duty to push forward the RPM levers, despite his statement that he had done so. The Board believed the captain may have touched the RPM levers (thinking they were already fully forward) or he may have even advanced the levers to a position he thought was fully forward. The Board did not believe, however, that either crewmember positioned the levers to the full-forward position before the takeoff roll began. Based on the above information, the Board could not rule out the possibility that the flightcrew's efforts to expeditiously comply with ATC instructions may have contributed to failure to achieve a proper takeoff configuration and their failure to recognize this condition.

Achieving a safe, orderly, and efficient flow of traffic in the ATC system requires a high degree of cooperation between pilots and controllers. Often, in day-to-day operations, each party attempts to accommodate instructions, or requests, of the other to their mutual benefit. This appears to have been the case in the exchange between the local controller and Flight 962's pilots. Notwithstanding the questionable appropriateness of the controller's instructions, the Board was concerned that the pilots may have unintentionally diverted their attention by making their takeoff expeditiously, thereby jeopardizing safety. Although nonstandard phraseology by air traffic controllers cannot be condoned, the Board believed it is essential pilots maintain a proper balance between complying with ATC instructions or requests and the manner of exercising their responsibility and authority for safe aircraft operation.

Probable Cause

The National Transportation Safety Board determined the probable cause of this accident was flightcrew coordination breakdown resulting in failure to comply with the Before Takeoff Checklist and advance the RPM levers to the high RPM position and, the flightcrew's failure to diagnose and remedy engine oscillations on initial climbout. Contributing to the flightcrew's failure to advance the RPM levers was the fact that both crewmembers had limited experience in the BAe-3101 and extensive recent experience in another aircraft which uses RPM control lever procedures that are different from the BAe-3101.

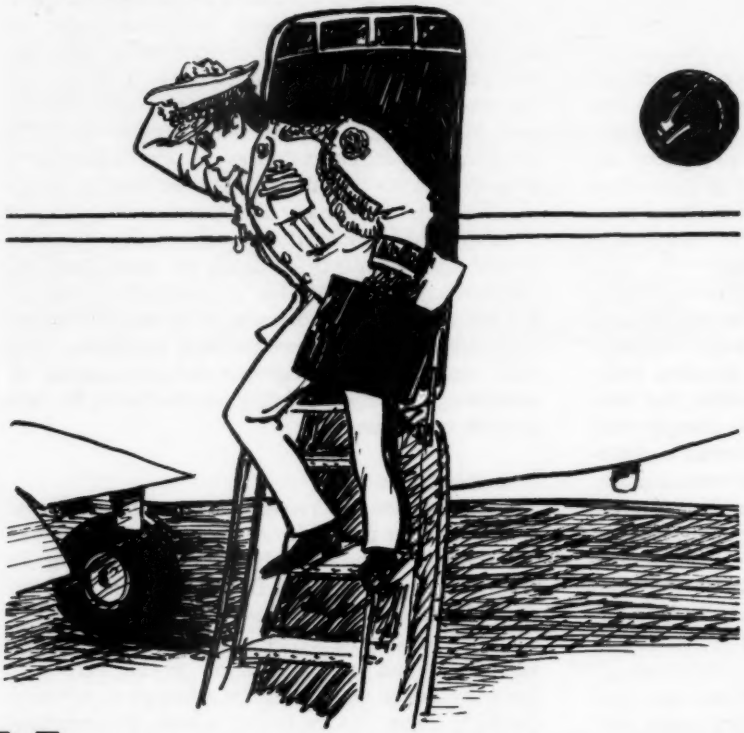
Application to MAC

This mishap has classic causes which apply directly to MAC operations. Distraction, habit pattern transference, checklist discipline and, on the part of the local controller, nonstandard terminology. MAC crewmembers can avoid the same fate by applying a few basic principles to their own flying—know your airplane, follow the checklist to avoid transferring habits and techniques from other airplanes, don't let outside agencies affect cockpit procedures or discipline and finally, in any emergency follow this basic guidance in Section III of your Dash One, in this order—**Maintain Aircraft Control, Analyze the Situation and Take Proper Corrective Action.** ✈

NTSB/AAR-88/06

Near Mishaps . . .

. . . can also come in threes.



Mac pumps a couple more quarters into the soda machine. The metal monolith delivers, but not the flavor he'd selected. Pondering the snafu, Mac mutters, "Root beer again. Well, at least I won't be transiting any Middle East countries with this in my bag. Last time I tried that, the authorities got excited over some idea that root beer is an alcoholic beverage.

"It's not the machine's fault, though. It merely produces what it's been programmed to do. Must be a parallel there for flying operations and my next flight safety message."

Our celebrated safety officer, Brad "Mac" MacKenzie, wanders through the corridors of base ops. He's using some well-deserved leave and taking advantage of space-A opportunities to visit a few overseas remote locations. Although a bit uneasy over having to fly as a passenger, he reassures himself with the knowledge that military pilots and their aircraft are a reliable and consistent lot. A King Air is still a C-12, even when it isn't a MAC-owned resource.

Standing in front of the weather briefer's desk, Mac reviews the collection of "weather-guesser" cartoons displayed under the plexiglass countertop. The lonely silence is broken as he hears an aircraft making a prelanding pass over the field. He hustles to the flightline to catch a glimpse of his twin turboprop transportation. "How come these weather shops don't have windows?" Mac asks himself. "Might be good AF Form 1000 material."

Now standing on the flightline side of base ops, Mac screws in a fresh set of earplugs and watches the C-12 stop in the first 3,000 ft of runway, then high-speed taxi to the military ramp adjacent to the end of the runway.

Mac observes an interesting play unfold before his eyes. As the aircraft comes to a stop, nose towards base ops, the cabin door opens even before power is reduced to idle. They must intend to make an engine-running-offload/onload (ERO). (Such a procedure from a C-12 is risky, at best; especially given the unfamiliarity of many passengers with flight ops, and worse because the entire crew complement of two pilots is located at the far end of the cabin from the exit door.) Sure enough, out pops a foreign air force officer—must be a general from the looks of all the stuff on his shoulders. He appears slightly disoriented by the wind blast from the prop. As the engine is reduced to idle, he struggles down the stairs while waving at Mac. The old guy almost loses his balance during this tricky maneuver, especially since the pilot has apparently forgotten to reverse the prop or lower flaps to help block the prop blast.

Now, this lone passenger starts to duck under the aircraft wing to pursue the shortest course to the operations building. Mac, anticipating such a move by the old gentleman, rushes to the aircraft and grabs the general by the arm and pulls him from his course. Almost invisible when at full RPM, and often disguised in the confusion of dust and noise, an aircraft propeller can take a vicious bite out of a human body.

The left seat pilot had helplessly watched in horror the

preceding events. Now he remembers the flaps and reverses the left prop before Mac clambers aboard. Finally, the copilot is in the aft cabin. He helps Mac stow his B-4 bag, and then secures the cabin door.

"Hi! I'm Mac MacKenzie. Base Ops already listed me on a pax manifest for this little hop. Sure glad you're goin' my way."

The pilots and Mac exchange a few words about the narrowly avoided tragedy in deplaning the host nation air force general. It had only been a quick "opportune airlift" prior to their training mission. Now, Mac would enjoy another opportune lift to yet another interesting spot in the Third World.

Noting the wings on Mac's shirt, the pilot offered to dispense with the passenger briefing and presume his familiarity with the plane. The copilot, however, said, "Let's not make that mistake again, Sir," and proceeded to recite every relevant detail for the next leg, as well as covering applicable passenger emergency actions. Finally, he added, "And please don't attempt to deplane until one of the pilots goes back to open the door for you."

While the copilot was providing the detailed passenger briefing, the left seat pilot had gotten takeoff clearance, taxied to the midfield intersection, and called "Lineup Checklist." Bewildered at being "behind the aircraft" already, the copilot quickly leafed through checklist pages and called out each item.

Visibly annoyed by the slow pace demanded by the checklist, the pilot responded to the final item and, in the same breath, announced, "We're rolling." He advanced power levers and the aircraft began to move forward.

The takeoff roll in a light C-12 is usually quite short—a couple turns of the props, and you're airborne. This roll seemed to take forever. Mac strained in his seat to see how much runway remained in front of them. The right-seater seemed uncomfortable, too.

Finally, the airspeed dial—which appeared to be stuck on 85 knots for an unhealthy period of time—jumped to 100 and the pilot pulled the nose up to takeoff attitude. "Gear up," the pilot commanded. Just as the handle was raised, Mac was startled by the loudest, most obnoxious warning horn he had ever heard. It continued to pulsate with monotonous regularity while both pilots, apparently as bewildered by the noise as Mac, poked and searched around the instrument panel for some explanation for the problem. After what seemed a thousand "Blarps" from that relentless horn, the copilot sheepishly reached for and raised the flap handle from the "Full Down" position. Neither pilot turned to see the perplexed look on Mac's face.

"This is not the way we usually do things in MAC," said Mac to himself. Of course, flying teenie weenie airplanes at remote locations is bound to offer some surprises. "Now," he muttered, "I really have some safety meeting material!"

The rest of the climbout procedure seemed normal, and Mac finally began to relax with the sight of another sunset viewed from an airborne perspective—until . . . "ALT WARN." There it was—the red light on the center instrument panel illuminated in bright contrast to the orange sunset on the windscreen. Both pilots searched about the cockpit, fiddling with the cabin altitude controller, checking circuit breakers, etc. Cabin altitude had reached almost 13,000 ft! Finally, the copilot pointed to the "Cabin Pressure Dump Switch."

Mac could barely overhear the ensuing discussion between the pilots. "It's not in the checklist." "The crewchief set us up." "Let's just call it 'a bad day,' and leave it at that."

Mac felt a floating sensation. Drifting inside the C-12 cabin, he could actually see an image of his own body straining forward to see the aircraft's instrument panel. Could he be revisiting a final sequence of events leading toward impending doom?

"Captain MacKenzie. Captain MacKenzie, wake up! It's almost time for the safety meeting!" Lt. Kerr could see Mac was beginning to come out of what seemed to be a trance. He contorted his face into one of his famous "clown expressions" to get his attention, and then helped Mac get on his feet.

". . . an aircraft propeller can take a vicious bite out of a human body."

"Sure seemed like it was really happening, J.J."

"You just had a bad dream, Captain MacKenzie. Maybe you're anxious about that long leave expedition you've scheduled."

"Could be. On the immediate agenda, though, we've got a safety message for this group!"

Charleston a

Professionals meetin

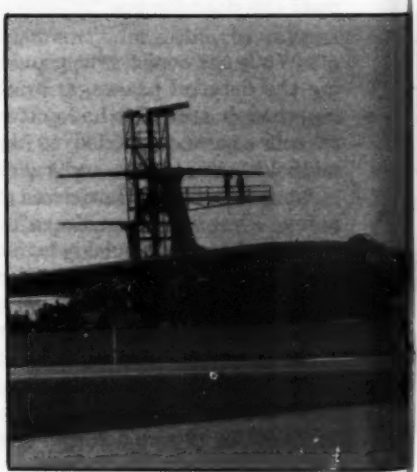
By Maj. Thomas C
Supervising Ed

Say "Charleston, South Carolina," to a Civil War history buff, and he'll talk of Fort Sumter—the location of the first shots fired in that epic struggle. Speak of Charleston to those interested in architecture, and they'll speak of pastel-colored mansions and a history of southern grace and charm. But, mention Charleston to MAC people and they'll think and speak of Charleston Air Force Base, home of the 437th Military Airlift Wing and its fleet of C-141Bs.

As is the case with many Air Force bases, Charleston's history goes back to the days preceding World War II. Although no immediate action was taken, Charleston was noticed by the

The busy 437th Aerial Port Squadron.

Charleston's new civilian terminal.



A C-141B gets a check-up.

n and The 437 MAW

meeting the challenge.

j. Thomas C. Weinzierl
pervising Editor

Army's Air Service as early as 1919. It wasn't until the U.S. entered WW II that the Army Air Corps took control of the field, but still allowed commercial use.

The base, under First Air Force, was used as a B-17 and B-24 combat and gun crew training site. It was transferred to Air Transport Command in 1943 as a C-47 transport training base. C-54 training began in 1945.

While Charleston was undergoing these war-caused changes, the 437th was activated as the 437th Troop Carrier Group at Baer Field, Indiana, on 1 May 1943. The group was transferred to Ramsbury, England, in January 1944, to support the two-front invasion planned for France and southern Italy.

The group took to the air 6 June 1944 in their C-47s, CG-4A gliders in tow, to participate in the Normandy invasion. They went on to participate in the allied advance across Europe to Germany. The 437th flew in the first air assault of Germany and resupplied ground forces to sustain the final assault. After victory in Europe, the group evacuated prisoners of war and transported displaced persons to relocation centers, and finally returned stateside for deactivation in November 1945.

After reactivation as a reserve group at Chicago O'Hare Airport in 1949, the group was elevated to wing status and transferred to Japan in 1950 to take part in the Korean War. After another deactivation in 1953, the wing was reactivated in 1966 and joined with the 1608th Air Transport Wing at Charleston.

Wing aircrews and airplanes have been involved in just about every contingency and relief operation in recent memory. Maintaining a safe operation while performing a wide variety of missions in ever-changing environments is a tough challenge. To get the Charleston safety perspective, I sat down one bright May morning with Lt. Col. Jim Turner and his safety staff.

Since each MAC base has unique operational problems and requirements, I opened the discussion by asking what set Charleston apart from other MAC locations. Colonel Turner's reply centered on the most obvious aspect—joint civil-military airfield use. "But, we have a good working relationship with the folks on the other side of the field. Most of them (air traffic controllers) have been here a while and are familiar with our operation. They know what we do and what we request. Intermingling civilian and military traffic presents a real safety challenge. It calls for MAC aircrews to keep their heads on a swivel when they come in here."

Another unique challenge is the 437th's special operations mission. The wing flies both Special Operations Low Level (SOLL), requiring daytime low-level profiles using terrain masking techniques and SOLL II. Using night vision goggles, SOLL II crews fly their missions with no exterior aircraft or airfield lighting. The 437th is the only C-141 wing flying this mission.

"We have one of our FSOs designated as Special Ops Safety Officer," said Colonel Turner. "He goes out on special ops missions and exercises as an interested third party. That way he can maybe spot some things that may not be recognized by those so close to the mission. We've found that with the caliber of people in our special ops program, the best of the best, we have a very safe operation."

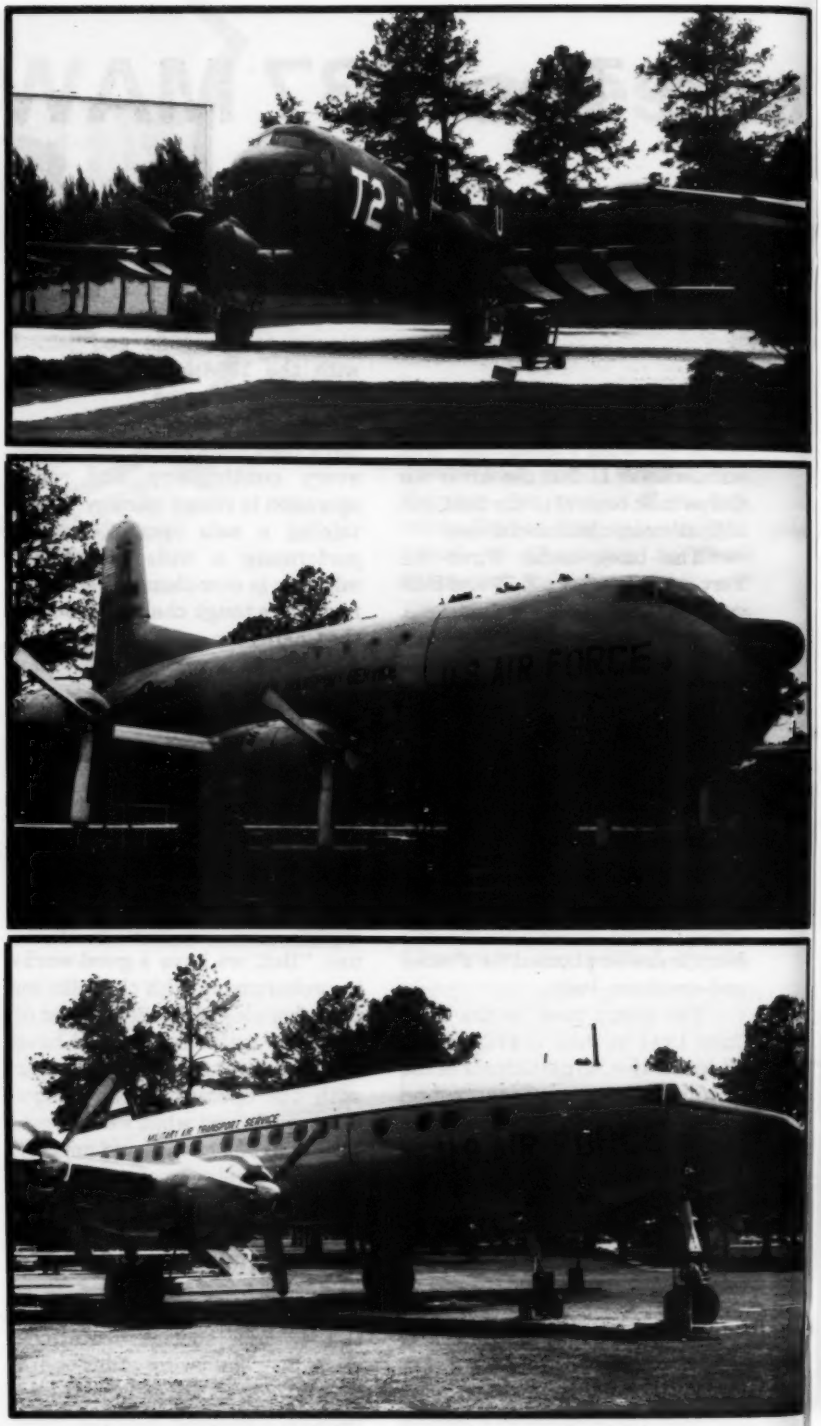
The wing also has a very heavy airdrop commitment—in fact it provides over 44 percent of MAC's total C-141 airdrop capability, airdropping more than 1,000 tons of cargo and 30,000 troops each year. Taking advantage of the C-141B's air refueling capability, all Charleston airdrop crews are air refueling qualified. Many airdrop missions call for air refueling after the drop, maximizing the number of events accomplished on each mission.

Of course, along with the air refueling modification, the C-141 was also stretched, generating another safety officer concern—tail scrapes. "Tail scrapes seem to come in cycles," Colonel Turner said. "We won't have one or hear of one for quite a while, then a couple pop up. Pilots just need to follow the guidance on proper landing technique. It pays to brush up on it occasionally and not get complacent."

Another subject aircrews can't get complacent about is midair collision avoidance. Colonel Turner discussed this topic, saying, "The Eastern Seaboard is a very busy air corridor. We all have to keep constantly aware of how busy it is out there. We have a civil awareness program at Charleston. We rent an Aero Club airplane and fly to civilian airports throughout the state. This does two things—it shows the Air Force uniform but, most importantly, it lets the civilian folks know we're concerned about them and the midair problem. The FAA has also established an Airport Radar Service Area (ARSA) at Charleston in response to increasing traffic. It hasn't impeded our operation, but we believe having everyone receive a clearance into and out of the area has made it safer."

Charleston crews face another unique operational challenge on their numerous missions to Africa and Central and South America. Nonradar environments and communications difficulties between countries require constant knowledge of what's happening and what to expect. "You can't go in command if you haven't been there" may sound a little excessive, but it makes good sense. For example, hazards such as the mountainous terrain around La Paz, Bolivia, and the altitude of the airport itself are unique. With the airport at 13,000 ft, just walking around the ramp without supplemental oxygen can cause a degree of hypoxia. High true airspeed on final raises concern about tire limit speed on landing. Decreased performance on departure due to the altitude calls for careful takeoff planning. Remember, the PK (Probability of Kill) if you run into a mountain is *one.*

Just getting a good weather



C-47 "Gooney Bird," C-124 "Old Shakey," and C-121 "Connie," on display in Charleston's airlift heritage park.

forecast in South America can be difficult. Most countries have fairly ancient communications systems and lack ability to receive forecasts from other countries. You're often just going on the best guess of the weatherman at your departure base. The South American region has a tendency to build towering thunderstorms, so having and relying on a good radar is very important. Receiving up-to-date NOTAMS is also rather difficult.

We also discussed language problems. While air traffic controllers speak English, you have to stick to standard ICAO terminology to avoid misunderstandings.

Other 437th missions include such unique locations as Guantanamo Bay, Cuba, and Ascension Island in the South Atlantic, as well as numerous places throughout Africa.

The wing obviously handles a wide diversity of missions in an exemplary manner but, to get another perspective, Maj. Dale Kortum, wing FSO, escorted me to the newly reactivated 17th Military Airlift Squadron to chat with Lt. Col. Larry Marino, 17 MAS Chief Pilot.

Discussing the squadron's reactivation, Colonel Marino said, "The official start-up date was 1 November 1987, although we started planning as a staff on 1 August. The main idea behind establishing another squadron was to thin out some of the command and control. It's extremely difficult when you have as many people as we had in the other three squadrons. The span of control in terms of supervisory positions was just too deep. We needed to allow supervisors to concentrate their efforts on fewer people. When you have a chief pilot dealing with 90 or 100 pilots, it's really tough to make sure the weaker pilots get all the attention they need while being sure the stronger pilots don't fall back.

"I was the 20th Squadron Chief Pilot for a year or so. I can see it's working—I can get to know the pilots better. The individual attention we can give people makes them easier to lead. But, although we're picking up most of the new people coming to the base from UPT or other weapons systems or staff jobs, we're still short on tactical folks. That's where the real need is now.

"We've lost some of our experience, and I've thought for a long time that in order to keep people we should concentrate our efforts on the young pilots. With some special attention, we could take those people from the structured UPT environment and provide them some structure here they could use to develop. We can't afford to let people flounder, the weakest person needs as much attention as the strongest.

"So what we've devised here is an IP-copilot program where every new copilot coming out of UPT has an IP who monitors the copilot's progress during his or her first 500 hours in the airplane. This gets them up to airdrop copilot certification for the male copilots. The program monitors all copilots up through first pilot; by that time they've finished three of their pilot training guides. At that time they're pretty much on their feet. So you can see, with this program, we've given them someone to discuss any problems they're having and resolve them.

"I keep the IPs on top of things by asking them how their copilot is doing. If there are any weaknesses, I expect the IP to note it and I expect to see it in the pilot training guide.

"This program takes someone who was perhaps seeking their own way through upgrade and marries them up with someone who has recently gone through it so he can turn around and impart that knowledge. Of course, the copilots are still responsible for their own progress. They have to be prepared. If they want to run a mission, they can't show up at show time without having checked weather, intel, FLIP, airfield restrictions, etc., and expect the AC to let them run the show. They have to show initiative. Every copilot should have an attitude of 'I'm an AC in training.' If you think of yourself as a copilot, you'll fall into the 'copilot syndrome,' which has been shown to be the cause of many mishaps. So this program lets both the copilot and the IP know what's expected of them. The copilots love it."

"The Eastern Seaboard is a very busy corridor."

My all-too-short visit to Charleston convinced me that, beneath what looks like just another MAC base, there are dedicated people meeting the challenge of both "routine" and "special" missions in an outstanding manner. The ever-changing and expanding MAC mission is being done effectively by folks who have the desire to make things work—safely.

On Top of the World

Daydreaming and lack of concentration=*Trouble*

By Capt. Paul E. Kent, USAFR
313 MAS, McChord AFB, Washington

Dirk looked at himself in the mirror; he had felt better. The late show time had permitted the crew to stay out late, and they did. A Honolulu crew rest didn't happen all the time, and staying downtown occurred even less. So most of the crew decided to celebrate their last night of the 8-day mission together. A late morning alert and direct flight to the West Coast would put them in during mid-evening—just in time for the Fourth of July fireworks display. This would be a piece-of-cake-day.

As he hurriedly threw his belongings together (most of them in need of a wash by now), Dirk mused about the evening at "Rose 'N Crowns." Singing *God Bless America* with the Australians had to be the high point of this trip. The Aussies were a hard charging group. Thank God we won 'America's Cup,' he thought, or those guys would have been unbearable last night.

"Well, enough fun 'n sun," he quipped to himself as he walked out the door with his bags. Then, as if possessed by an unknown entity, Dirk turned around. Walking through the room as though pulled by an invisible tractor beam, he quickly scanned the room for anything he might have left behind. Arriving at the bathroom he found the item that had subsconsciously summoned him. There on a towel rack next to a half-empty bottle of brew, left over from the previous afternoon's "crew debrief/get-together," hung his swim trunks, still damp from sailboarding at Fort DeRussy the previous afternoon. "Only a twenty-six buck donation" he facetiously demurred. "Sometimes, Dirk, you can be your own worst enemy."

Down in the hotel lobby, the assembling crew was already verbalizing on "the best trip ever" as they began the last leg of their journey. Dirk was promptly greeted with "Hey, mate," from the Australian flight engineer.

"Hey, captain, do you know the difference between a pilot and a pig?" the loadmaster asked.

Dirk bit.

"A pig wouldn't stand around trying to pick up a pilot," he joked.

"Speaking of pigs, I didn't know you could sing so well," Dirk shot back.

"Neither did I," the smiling load responded. "Neither did I."

After the two cabs dropped them off at Hickam Command Post, the crew split up for their standard chores. As he approached the historic building, walking side by side with his young copilot, Dirk verified the standard ritual.

"You start the weather and I'll talk to Mother."

As the copilot headed upstairs, Dirk chided him, "And

HONORABLE MENTION
1988 MAC FLIGHT SAFETY WRITING CONTEST

tell the weather shop we need VFR and a million and 75 degrees. We want to enjoy the fireworks tonight."

Dirk's copilot had just completed his first pilot upgrade and his flying motor skills were above average. He would make a good aircraft commander. His most notable drawback was his tendency to sit back and take a four-engine airplane ride while performing copilot duties, rather than being the necessary "insurance policy" required of a truly exceptional copilot. The young man could become outright lazy, probably figuring, "It's not my leg, I think I'll take a break." Dirk wanted to talk to him about it but somehow had been unable to diplomatically approach the subject. Besides, Dirk thought, he preferred coping with a lack of initiative rather than a person who wants to do a million things and ends up driving you half bonkers.

Finalizing the flight/fuel planning process, the two pilots got a bite to eat and arrived at the airplane just as the cargo doors were closing. They looked at each other and smiled.

"Perfect timing, mate," the copilot said to his leader.

As Dirk climbed to the flight deck, the engineer anticipated the aircraft commander's inevitable question. "Good airplane, sir. There are a couple of previous write-ups about a flap asymmetry on extension, but they found the problem. The scanner is checking the data and we can jet out of here, so to speak."

Dirk looked at the young engineer with a smirk.

"No pun intended," the engineer added sheepishly.

"So to speak," Dirk added.

They departed soon after.

"Gear up, mate," Dirk commanded. He breathed a sigh. Airborne and heading home. It was a good feeling. Banking away from the reef runway, Honolulu and Waikiki disappeared on the left. It was a beautiful day.

"Can you believe we're getting paid for this?" Dirk asked over the interphone.

"It's actually our job," the copilot joyfully added.

"Flaps up," Dirk commanded at the appropriate speed.

"Flaps up," the copilot responded as he raised the lever.

"Flaps are up," Dirk announced, reminding his sea-gazing copilot of his mandatory interphone call. Dirk breathed another sigh of relief, the flap asymmetry write-up lost somewhere in the vast network of unassembled information in his mind.

"We're passing 10,000 feet. Scanner and loadmaster are cleared off interphone to do their thing," Dirk announced.

"Hey pilot," the loadmaster quickly responded. "Do you know the only thing that separates you from the lowest form of life on earth?"

Dirk bit again.

"The flight deck door," the loadmaster bellowed.

"After witnessing you last night, I'd have to agree," Dirk responded.

The loadmaster loved his image. He did a good job and worked hard. He played hard, too. Sometimes too hard. On the way back to his room the previous evening, he'd turned all the "Do Not Disturb" signs in the hallway to "Please Clean This Room Early." Although everyone seemed to think it was funny, Dirk was a little uneasy. Since he really didn't know why, he didn't say anything.

After leveling off, the crew settled in for the long, comfortable cruise home. Behind them the sun was setting and, as the eastern horizon became night, Dirk's thoughts slipped into a comfortable repose. He really enjoyed his job as aircraft commander and new instructor pilot. He didn't know if the Air Force would be a career, but it didn't matter. For now he was more than content. He'd been tested with a couple of in-flight emergencies and was satisfied with his performance. On his first flight as an aircraft commander, he had to shut down an engine and divert to Kadena AB, Japan, negotiating through thunderstorms generating strong crosswind on final approach, and with another engine reading low oil pressure. Crewmembers shook his hand after the uneventful landing. He was treated like a favorite son whenever he returned home to the small midwest city where both his parents were born and would die. He only needed to look around at his high school classmates to realize how very fortunate he really was. The 28-year-old Dirk thought, I'm truly on top of the world.

Dirk's thoughts were interrupted by the flight engineer's inquiry.

"Pilot, why did you choose heavies instead of fighters?"

The flight engineer was the youngest crewmember—eager and curious about everything. He was on his second trip since his initial checkride. Dirk hoped his curiosity would fuel his performance, as his air sense seemed lacking at times. But this was typical of new flight engineers. After just a limited maintenance background and some schooling, they were up in the air. Air sense was something learned over time. Hopefully, the young man would learn quickly and become a valuable asset to the engineer force.

"He could become lazy, probably figuring, 'It's not my leg," I think I'll take a break."

"I chose heavies so I could fly with class act gentlemen like yourselves," Dirk responded. Good answer, he thought.

It was completely dark as preparations were made for descent. The weather man had obliged with clear skies and unlimited visibility.

"Are you meeting your honey for the fireworks tonight?" Dirk asked his copilot.

The young man nodded, "Yeah, if they're not over by then."

"They won't be," Dirk reassured him.

Dirk gave the approach briefing. He would fly a visual approach, backed up by the ILS. He kept the aircraft speed at 250 knots until 12 miles out. Their south arrival would facilitate an expeditious approach.

"Flaps approach," Dirk commanded.

"Flaps approach," the copilot echoed, and he placed the lever to 75 percent.

"Uh oh," said the copilot as the Master Caution illuminated, accompanied by the Flap Asymmetry warning.

"Looks like a 75 percent partial flap landing to me," Dirk casually and calmly announced. "I'll add 5 knots to the marker. Engineer, you can doublecheck that and review the procedures."

Dirk was proud of himself. It was not a big deal—he was mentally prepared for this little dilemma.

"Gear down, Before Landing Checklist," Dirk requested.

"Wow, that's beautiful!" exclaimed the copilot as the first of the fireworks appeared in the distance off the right side of the aircraft.

"What a sight," the scanner in the jumpseat echoed.

"MAC 50241, cleared to land, check your gear down."

"MAC 50241 is cleared to land, gear is down," the copilot mechanically responded, mesmerized by the arsenal of lights off his right shoulder.

"What a super night for a fireworks display," Dirk added.

"They're spending over $10,000 on these tonight," the copilot enthusiastically informed everyone.

To members of MAC 50241, the "God's eye" view of this extravaganza was truly emotional. What a return home! This was a great feeling. They were truly privileged. Approaching the threshold, as Dirk returned his attention to this standard visual approach, he noticed the bright red centrifugally cascading hue in his right peripheral vision almost duplicated the color of the gear handle. His heart skipped a beat.

Dirk advanced the throttles to go-around power. The flight engineer had just begun silently reading the procedures dealing with flap asymmetry. The copilot's thoughts were already in the park with his arm around his girlfriend. The scanner was a thousand miles away, reliving a different dream. Dirk came within 30 ft of falling off "the top of the world."

At home later that evening and, with only the Almighty as his witness, he made a vow to himself. *"Never again be your own worst enemy."*

After graduating from the USAF Academy in 1975, Captain Kent received pilot training at Laughlin AFB, Texas; and C-141 qualification at Altus AFB, Oklahoma. Following assignments at McChord and Altus, Captain Kent separated from active duty. He is currently flying for a major airline and assigned to the 313th MAS (Assoc).

12 Hours, Bottle to Throttle

Is an even dozen enough?

By Capt. Brian S. Wilmott
525 TFS
APO NY 09132

The oldest, most popular drug in human culture is alcohol. It's been produced in great quantity and various forms by virtually every society in history. The ancient civilizations wrote about it and glorified it. Roman society viewed it as a sign of wealth and prestige for the upper crust and an easy escape from reality for the lower class. The popularity of this socially tolerated, mind altering substance has grown over the years and found substantial favor amongst many unique organizations. One of these groups, military airlift pilots, is the focus of this article.

There's nothing like a night at the club during those deployments all over the world. Spirits are running high, and the excitement is so thick you can cut it with a knife. It's a great time, but what protects these dynamic 20th century warriors from the effects of the whiskey river? Air Force word-of-mouth policy is "12 hours bottle to throttle." Military Airlift Command Regulation 55-XXX states: "Crewmembers will not be scheduled to fly nor will they perform crew duties after consuming alcoholic beverages within 10 hours of mission reporting time, or when under the influence of alcohol." The Navy uses "12 hours bottle to brief," which effectively gives them a 14-hour cushion. Is this enough? For what amount of consumption is this adequate? These questions provide the main reason for this article. It also addresses how alcohol affects the vestibular system, eye coordination, short term memory, fatigue, crew performance, and what it takes to recover from this self-induced stressor.

On any given Friday night at the bar, one might see an example of each stage of intoxication—buzzed, staggered, slobbered, stumbling, and faced. What is the component in alcohol that can produce such obvious changes in our nature? The active ingredient is ethanol. The human mechanism has a high affinity for ethanol, its primal effect being on the central nervous system. It acts as a depressant, impairing sensory skills, motor skills, and learned functions.

Alcohol absorption is influenced by gastrointestinal contents, and composition and quantity of the alcoholic beverage.

All of the initial absorption of alcohol takes place in the intestinal tract. From the intestines, the vascular system carries alcohol to muscle tissues, organs, and virtually every other part of the anatomy where it can be uniformly absorbed.

Two areas are inconsistent with the uniform absorption rule: the brain and cerebral spinal fluid, where alcohol concentration is slowest in rising and falling. In these physiological systems, alcohol inhibits the uptake and utilization of oxygen by the cells. This induces a hypoxic condition in these systems.

Tissue poisoning, to the extent of oxygen deprivation, is referred to as histotoxic hypoxia. The most common form of hypoxia known to pilots is hypoxic hypoxia, induced at altitude without supplemental oxygen, and can result in symptoms ranging from dizziness to incapacitation. Similarly, your ability to maneuver one foot in front of the other on the ground when under the influence of histotoxic hypoxia can be equally impaired. Unfortunately, gang loading the oxygen regulator to 100 percent won't do a thing to cure histotoxic hypoxia.

Now that your tissues are hypoxic, let's talk about what's happening to one of your most important organs—the brain. Alcohol depresses the cortical processes as would a sedative. It lowers your inhibitions and degrades your performance in almost every task. First, it worsens your performance, increases reaction time, impairs tracking performance, degrades distance judgment and decreases visual acuity. Second, due to relaxed inhibitions, it makes you believe you are more capable than you actually are. Even to the untrained eye, it's obvious that a task as easy as simple communication can become brain cramping. These indications, among others, are obvious signs we can use to monitor degree of intoxication.

Other less obvious biological effects are taking place during the metabolism of alcohol. A study published by *Aerospace Medicine*, October 1970, shows alcohol severely disrupts short-term memory. "Disorder of memory manifests itself in the form of a remarkable, peculiar amnesia in which the memory of recent events is disturbed, whereas long past events remain remembered quite well. Mostly, this type of amnesia develops following prodromal agitation with confusion. The agitation lasts several days, and the patient becomes calm again. His consciousness clears, he appears to be in better possession of his faculties, receives information correctly, yet his memory remains deeply affected. It was shown that shorter spans of short-term memory (STM) were affected with a rise in the blood alcohol concentration (BAC) from .07 to .103 mg."

Fozard, Wienert, and Ryback demonstrated in a recent study that moderate doses of alcohol which would disrupt short-term memory would also detrimentally affect time perception. This is not surprising since memory and time perception are closely related entities. The decrease in time perception found with alcohol in the latter study can impair flying ability and cause mishaps. According to Ryback, "the perception of the speed of an oncoming object (its velocity) depends upon the pilot's subjective judgment of the time rate of change of displacement of the other object, hangar, target, etc." It's easy to see that disruption in STM and time

perception abilities have serious implications for flight safety. Factors affecting the degree of this type of impairment include the amount of alcohol consumed and the length of time since ingestion. Effects of this nature can be seen in hangover conditions after the blood alcohol concentration is zero.

Additional behavioral effects of alcohol can be shown in the relationship between vestibular stimulation and eye movements. These effects are present even after the blood alcohol content is zero. Prove it to yourself. The next time you have a hangover, rapidly turn your head from side to side and note the disorientation and difficulty focusing.

The semi-circular canals in the inner ear provide your sense of balance and act as angular accelerometers. According to Roger Green, Principle Psychologist RAF Institute of Aviation, each canal is a fluid-filled tube with a watertight swing door across it. The fluid tries to stay still because of its inertia and affects the door one way or the other, depending on the direction of the head's angular acceleration, whether produced by voluntary head movement or by some external motion such as aircraft yaw, pitch or roll.

"Movements detected by the inner ear are used to stabilize the visual world on the retina by the elicitation of eye movements, i.e., eye movements are made to compensate for head movements so the world does not appear to fly about on the retina." For example, if you move your head while reading the paper, you can still focus and read; however, if you move the paper rapidly up and down with your eyes fixed, you can't read it. In order for the system to work, the watertight door must be unaffected by linear accelerations such as gravity and, to be so unaffected, the door must have the same specific gravity as the fluid. Alcohol in this system disturbs this specific gravity balance. The flap tends to float, and the deflection is interpreted as a head movement, and a compensatory eye movement is made. However, as no real head movement was made, the eye movement is inappropriate, and the subject perceives the world to move.

According to Roger Green's *A Guide to Booze*, "this effect follows closely on the consumption of alcohol and is known as positional alcohol nystagmus. As the fluid and flap come into alcoholic balance, there follows a phase with an absence of abnormal eye movements; this is followed by a second phase of positional nystagmus. This subsequent phase is caused by an imbalance of specific gravity between the fluid and the door as the system loses alcohol." A significant factor is that alcohol remains in this system long after blood levels have become negligible. With increased G, the imbalance is effectively amplified.

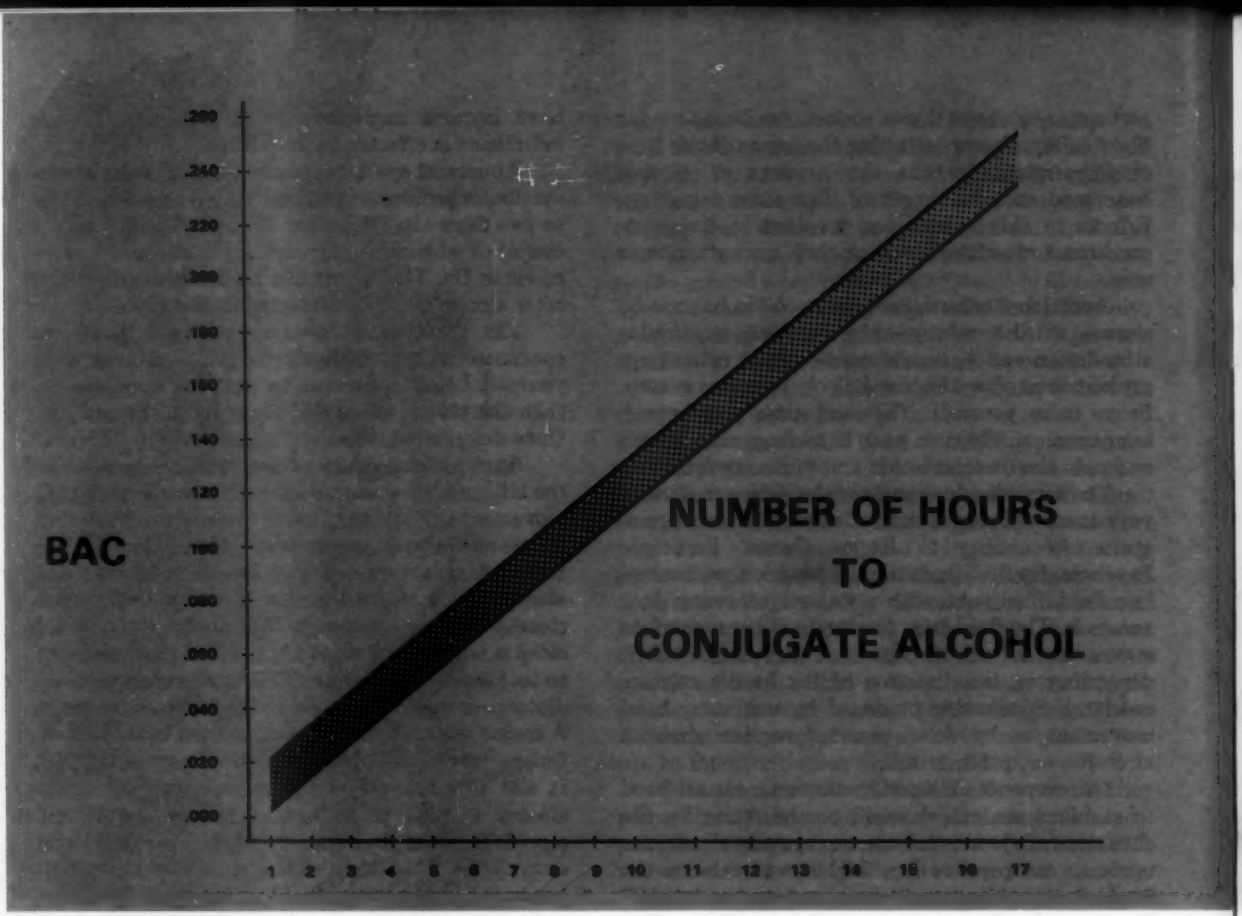
Abnormal eye movements that are evidence of vestibular problems (nystagmus) can be produced up to two days after drinking the equivalent of only a couple of whiskeys if the subject is exposed to two or three Gs. This effect can be demonstrated long after alcohol can't be detected in the blood.

The significance as far as flight safety is concerned is not difficult to grasp. If you find yourself being subjected to unusual acceleration, then the effects discussed may well disorient you. Once disoriented, recovery is much more difficult.

Another biological function directly impacted by the influence of alcohol is sleep, specifically rapid eye movement (REM) sleep. REM is a stage of sleep that occurs numerous times during a sleep period. For the brain, the most active sleep takes place during REM sleep. This is also the period in which dreaming is closest to consciousness. Most importantly, REM sleep is the stage of sleep which is the most valuable to total rest. If a person's REM sleep is continually disturbed, that person will awake far more fatigued. A major research program conducted by NASA on fatigue was initiated by the U.S. Congress in 1980. It was aimed at assessing the psychophysiological effects on pilot performance and the operational significance for flight safety of various flight and duty cycles. This study was extended due to interest generated by the initial findings and the significance to flight safety. According to Hawkins, in an analysis of data obtained from the confidential ASRS program, NASA reported that fatigue-associated decrements in performance resulted in substantive, potentially unsafe conditions in aviation. The British CHIRP system announced in 1984 that the largest number of reports received from pilots concerned fatigue, sleep, and the way in which work patterns are constructed.

The U.S. Navy experienced a mishap on the island of Kauai, Hawaii, in the early 1980s. One of the primary causes was attributed to fatigue. The Navy had a Soviet submarine trapped below the surface off the Kauai coast and was maintaining 24-hour surveillance. The missions were flown in 12-hour shifts with the relief aircraft arriving on station at 0400 and 1600 hours. The mishap aircraft was the 0400 relief, and the aircrew was experiencing sleep loss fatigue.

Sleep loss fatigue is a subtle compromiser of performance and insidious in nature. The effects on this aircrew were revealed in cockpit voice recordings. Recordings showed the crew was experiencing problems such as short attention span, increased error rates, carelessness, lowered performance levels,



and impaired recent memory—all clinical indications of performance degradation due to fatigue.

Contributing to the mishap was an upset in the crew's normal sleep patterns and loss of situational awareness relative to a mountain peak on the island of Kauai. The aircraft impacted the side of the mountain at 0445. Although alcohol did not have a direct impact on this mishap, fatigue did—and alcohol *does* have a direct impact on fatigue.

Though not involving alcohol, there are numerous other mishaps listing fatigue as a causal factor. A T-38 on a night student sortie terminated in ground impact due to spatial disorientation compounded by fatigue. The human body is much more susceptible to spatial disorientation under conditions of fatigue. An F-16 two-ship mission terminated with the wingman impacting an empty warehouse. The mishap pilot had experienced chronic fatigue in the days prior to the mishap. This pilot descended below authorized minimum altitude during an intercept and suffered channelized attention on the suspected target. (Studies in sleep deprivation have shown people lose their ability to concentrate in a multi-task environment.)

Back to our 12-hour rule and its validity as a blanket rule. A discussion of the rate at which the human body conjugates (metabolizes) alcohol is in order. Conjugation of alcohol begins immediately after absorption. The conjugation rate varies for individuals but falls between .010 percent to .020 percent per hour (assuming a normal liver). The average of these two rates will be the baseline used in this discussion. If you consume 10 beers, your BAC would be .20. Apply the .015/hr conjugation rate (.20 divided by .015), it would take 13.33 hours for your BAC to reach zero. Similarly, we can use this rate to assess an earlier BAC.

As can be seen by the graph, an evening of fairly heavy drinking (in excess of 10 beers), followed by a sortie 12 hours after drinking, would result in the pilot flying under the direct influence of alcohol. No professional military pilot would intentionally fly with alcohol in his system, but he could unknowingly find himself in this situation. Therefore, in this instance, 12 hours is not enough for anyone other than a light social drinker.

In a computer analysis run at AFISC, several mishaps were listed with alcohol as a direct or

suspected factor. One of these was a four-engine transport which impacted the water 53 minutes after takeoff. Crew fatigue due to crew rest violation, and impairment resulting from the aftermath of alcohol consumption, were listed factors. Although the crew had low concentrations of alcohol in their system, they most probably did not intentionally fly "under the influence."

The conjugation rate proves how a pilot believing in the 12-hour rule could be lulled into thinking he's fit to fly when, in fact, he still has a lethal BAC. However, this is strictly a function of alcohol detectable in the blood. As discussed in this article, the total effect of alcohol on the human mechanism has serious ramifications for flight safety far beyond a simple BAC. For purpose of discussion, the residual effect of alcohol on the entire human body after a BAC of zero will be called a hangover.

A severe hangover can be as crippling to a person as a migraine headache, and the blood would show a BAC of zero. This is the most serious implication of alcohol's effects with respect to the 12-hour rule. Remember the impact alcohol has on the vestibular system, fatigue, and short-term memory. Now, we add the pain and misery of headache and nausea, and we have serious degradation of human performance, in, or out, of a cockpit.

In 1985, a study was conducted at Stanford University and Moffett Naval Air Station. The question addressed whether pilot performance is impaired 14 hours after drinking enough alcohol to be considered legally intoxicated. Keep in mind the BAC for this study was a maximum of .10, or the equivalent of five beers, so the effects of hangovers can be considered far less severe than we may experience after a heavy night at the club. Additionally, at the time of the tests, the BAC in the subjects was zero.

The study was conducted as follows: Ten Navy P-3C Orion pilots under the age of 32 and in excellent health were the subjects. All pilots were experienced flyers, and reported drinking from two drinks per week to two drinks per day.

The pilots flew the simulator profile which consisted of a series of precise maneuvers. Each flew one of two scenarios—one without a hangover, and the other under a hangover condition. In the "hangover condition," pilots flew 14 hours after attaining a BAC of .10. There was a one-week delay between the no-hangover and hangover flights.

The profile included two crucial maneuvers: (1) takeoff and loss of two of four engines and (2) return to the airport and the same runway with an instrument approach to landing. The scenarios stressed the importance of hangover effect on execution of unusual or emergency procedures.

On virtually all measures, performance by pilots in a hangover condition was worse. Aircraft control during the takeoff emergency was markedly degraded, as well as during the landing phase of flight. This study reveals performance was impaired by the effects of the hangover 14 hours after a BAC of .10.

Discussion in the study addresses the fact that alcohol affects many aspects of memory, as was discussed earlier in this report. With this adverse effect, the pilot's ability to process information is impaired in that a person's ability to divide attention between two or more tasks is adversely affected.

The report states, "Pilot performance is highly dependent on those components of human cognition. Pilots must maintain a variety of information in working memory during most phases of flight. Thus, pilots in such conditions may experience an overload of processing demands when their processing capability has been reduced by drinking."

The ability to perform under more severe adverse conditions, such as emergencies in which normal behavior patterns are abruptly broken, will be critically degraded by the effects of alcohol on the cognitive process. During an emergency, the pilot must be able to instantly draw on all his faculties to deal with the situation properly and safely.

In conclusion, this study pointed out the pilots were unaware of having any type of hangover and were highly motivated to disprove the hypothesis of the study. With the results so clearly indicating the impairment experienced 14 hours after a BAC of .10, one can see the degree of impairment would be far more severe 12 hours after a BAC of .18 (almost twice of what was used in the study) which would be considered "legal" under the 12-hour rule. It is clear there has been, and is, a serious lack of research into this area. More studies must be conducted under various conditions to determine if there can be some kind of realistic "bottle to throttle rule." With a 12-hour bottle to throttle limit, we're setting our pilots up for a potential air disaster. Certainly, awareness of this subject must be brought to the forefront of the aviation community.

Education on the "total effect of alcohol on pilot performance" is the most realistic approach to this problem. Although this won't totally eliminate the problem, it will certainly give each pilot a little more incentive for self-monitoring when taking a trip down the whiskey river that first night of the deployment.

(Due to space limitation, numerous references listed in this report aren't included. They are available on request from *TMF*.)

Flying-Hour Milestones

2,500

919 SOG

Lt. Col. William S. Barksdale, III.
Lt. Col. Harold F. Casey, Jr.
Lt. Col. Barry F. Davis
Lt. Col. Joseph P. Gangwisch
Lt. Col. Wesley R. Gunn
Lt. Col. William G. Sloan, Jr.
Lt. Col. Roy E. Stuckey
Lt. Col. William W. Tyre, Jr.
Lt. Col. Wallace K. Wooley
Maj. Thomas J. Brown
Maj. Walter S. Burrough
Maj. Richard W. Champion
Maj. Charles T. Curry
Maj. Richard H. Dawson
Maj. Donald E. Dyrda
Maj. Ronald E. Edinger
Maj. William P. Farrell
Maj. Alva D. Greenup
Maj. Robert A. Gualtieri
Maj. Gregory Hanson
Maj. Michael P. Hayes
Maj. Walter L. Hunt
Maj. Ralph R. Jaeger
Maj. Clay T. McCutchan
Maj. William L. Muench
Maj. Edmund B. Patterson, II.
Maj. David C. Peel
Maj. John W. Selfmedlin
Maj. Dale E. Spieth
Maj. Elsmer L. Thomas
Maj. Craig L. Workman
Maj. David C. Worrall
Capt. Elliott W. Allen, Jr.
Capt. David S. Beidel
Capt. Edward C. Brasher, Jr.
Capt. Guy B. Gordon
Capt. David M. Jowers
Capt. Robert F. Littlefield
Capt. Michael L. Milton
Capt. Daniel A. Wakley
Capt. Michael N. Wilson
Capt. Robert R. Winter
CMSgt. Homer W. Whitworth
SMSgt. Michael E. Gengor
SMSgt. Harry T. Killam
MSgt. Michael J. Brocksmith
MSgt. William A. Ellison
MSgt. David J. Gardner
MSgt. James R. Gennaro
MSgt. Tom Grimes
MSgt. James R. Lewick
MSgt. Fred D. Rowell
MSgt. Joseph W. Simmons
MSgt. Walter L. Whatley, Sr.
TSgt. William N. Wilson

73 AES

Lt. Col. Mary J. Bigongiari
Lt. Col. Joan D. Burke
Lt. Col. Mary K. Campbell
Lt. Col. Richard J. Quiram
Maj. Llewellyn Alspach
Maj. Steven A. Beals
Maj. Linda L. Carneal
Maj. Denis D. Cesare
Maj. Merle M. Clark
Maj. Edward C. Custer
Maj. Francis W. Furlong
Maj. Christopher M. Hayes
Maj. Frederick S. Hoffman
Maj. Benita J. Heffner
Maj. Francis B. Lane
Maj. James Mancini
Maj. Walter J. Mazurowski
Maj. James E. Metzler
Maj. Allen N. Mohllewsky
Maj. Roger L. Pawlewski
Maj. William R. Pfeil
Maj. Lenhart D. Saner
Maj. Gregory L. Storey
Maj. Burnell S. Stuchell
Maj. Richard M. Wieczorek
Capt. Elizabeth A. Buck
Capt. John A. Jones
Capt. Russell M. Judge
Capt. Stanley E. Lenon
Capt. Timothy P. Phillips
Capt. David M. Smith
2d Lt. David A. Brown
MSgt. Daniel E. Archer
MSgt. John R. Barone
MSgt. Eugene H. Busch
MSgt. Samuel J. Dalton
MSgt. Donald R. Frackson
MSgt. Stephen L. W. Lindsey
MSgt. Robert L. Mallak
MSgt. Leslie E. Ramee
MSgt. James H. Shaughnessy
MSgt. Richard N. Snyder
TSgt. Jerome D. Brewer
TSgt. Robert R. Clark, Jr.
TSgt. Michael C. J. Kallinick
TSgt. Ronald L. Mills
TSgt. Christopher J. Pfeil
TSgt. Paul H. Ramee
TSgt. Marek K. Uszwicz
TSgt. Joseph W. Vitthuhn
SSgt. David W. Hale
SSgt. Harold E. Krohne
SSgt. Ronald A. Marshall, Sr.

728 MAS

Lt. Col. Richard D. Hornby
Lt. Col. Richard J. Logan
Lt. Col. William L. Mueller
Maj. Charles E. Baker
Maj. Ronald S. Barnick
Maj. John C. Bentley
Maj. Edward S. Clyde
Maj. Samuel S. Dickinson
Maj. Jacob A. Gasper
Maj. Thomas J. Gemmell, Jr.
Maj. Loren D. Giles
Maj. Douglas H. Hill
Maj. Thomas L. Law
Maj. Arlyn S. Mick
Maj. Billie J. Rahm
Maj. Gary L. Reed
Maj. Jeffrey W. Sheets
Maj. Thomas F. Teal
Maj. Richard P. Tedesco
Maj. Thomas W. Vinson
Maj. George R. Ziegler, III.
Capt. Paul C. Beck
Capt. Conrad R. Braun
Capt. Laurence J. Butler
Capt. Terry W. Cope
Capt. Lelvin Crowe, Jr.
Capt. Randall P. Ferris
Capt. Daniel F. Garcia
Capt. Thomas J. Gravelle
Capt. Paul M. Hanson
Capt. Truman J. Hedding
Capt. Thomas W. Kemp
Capt. Walton T. Lindsey
Capt. William C. Mann
Capt. Randall P. Otto
Capt. Jeffrey R. Satterwhite
Capt. Kurt W. Shuler
Capt. Gregory E. Stewart
Capt. Kelly G. Wilson
SMSgt. Herbert C. Guinn
MSgt. Charles D. Brown
MSgt. Gregory W. Charlebois
MSgt. Antonio Fontanez
MSgt. Frederick Geist
MSgt. Donald G. Kochackis
MSgt. Louis E. Larson, III.
MSgt. William M. Morley
MSgt. George Ramirez
MSgt. David N. Schluttenhofer
MSgt. Henri E. Thibault
MSgt. Daniel P. Thompson
MSgt. Leroy N. White
TSgt. Walter N. Castanedo, Jr.
TSgt. Richard G. Dukes
TSgt. Kim H. F. Hansen
TSgt. Ronald Howard
TSgt. Daniel K. Jones
TSgt. James R. Lewis
TSgt. Carol L. Loveless
TSgt. Floyd J. Lucia, II.
TSgt. Michael R. Maclean
TSgt. Alejandro Medina, Jr.
TSgt. William L. West, Jr.
SSgt. Richard P. Cowen
SSgt. Bret L. Knight
SSgt. Robert B. Lesniak

109 TAG

Lt. Col. Robert A. Dawes
Lt. Col. Jay D. Fuller
Lt. Col. Lawrence A. Maciariello
Lt. Col. Brian G. Maybee
Lt. Col. Daniel J. Slovak
Lt. Col. Peter C. Wenger
Maj. Jonathan E. Adams
Maj. Lawrence J. Altieri
Maj. Theodore R. Bell
Maj. John R. Mancini
Maj. Elliott N. Marchegiani
Maj. Willard G. Merwin
Maj. Michael Reitan
Maj. Richard M. Seburro
Maj. Arthur E. Urschel
Maj. Giles C. Wagoner
Maj. Wolfgang Walther
Maj. Eric G. Wiener
Capt. Richard Y. Bayly
Capt. Brian G. Gemula
SMSgt. Norman M. McKnight
MSgt. Thomas S. Grugan
MSgt. Richard G. Phillips
MSgt. Alfred E. Stahl
TSgt. Brian F. Meaney
TSgt. Raymond P. Morgan

135 TAG

Lt. Col. David W. Arnett
Lt. Col. Charles A. Blair
Lt. Col. James H. Hull, Jr.
Lt. Col. John C. Schnell
Maj. Brian T. Burke
Maj. Jeffrey B. Burbridge
Maj. Steven D. Fletcher
Maj. Bruce W. Huester
Maj. Ronald T. James
Maj. Edward D. Krueger
Maj. Morris E McCormick
Maj. Michael F. Murphy
Maj. Carl Nagel, III.
Maj. Swiatoslaw Pawliuk
Maj. David M. Rein
Maj. Warren E. Thomas
Maj. Peter D. Trapp
Maj. Daniel L. Watkins
Maj. Kevin A. White
Maj. Ralph A. Youngs
Capt. Thomas F. Baldy
Capt. Peter J. Bergamini
Capt. Brian K. Borbet
Capt. James D. Busbong
Capt. Thomas Lockie
Capt. Charles E. Meacham
SMSgt. Edmund R. Scharborough, III.
MSgt. Richard A. Essel
MSgt. Keith M. Gregory
MSgt. Kenneth G. Ninkovich
MSgt. Lewis W. Smith
MSgt. Daniel A. Spradling
MSgt. Harold E. Stewart
MSgt. Fredrick R. Williams
TSgt. Charles L. Cherry
TSgt. James A. Greaves
TSgt. Edward A. Rehbein
SSgt. Steven C. Pargan

167 TAG

Lt. Col. Raymond C. Sandy
Lt. Col. Barry W. Smith
Lt. Col. James L. Johnson
Maj. Stephen R. Orr, III.
Maj. Richard H. Agnew, Jr.
Maj. David A. Crowther
Maj. Daniel J. Duffy
Maj. William J. Emmer
Maj. Charles J. Enders, III.
Maj. George W. Hamm
Maj. Dennis M. Howard
Maj. Reginald W. Lemon
Maj. Virgil W. Lloyd
Maj. Anthony E. Lerber
Maj. Jesse A. Thomas
Maj. William V. Hughes, Jr.
Maj. William R. Gain

97 MAS

MSgt. Gordon M. Barrager
MSgt. Larry R. Vittum-Jones
MSgt. Spencer G. Wedlund, Jr.

TSgt. Thomas H. Block
TSgt. Orson Williamson
SSgt. Jimmy L. Brazzle
SSgt. Thomas S. Cartmell
SSgt. James M. Dowell
SSgt. Rodney W. Dunlap

73 AES
Maj. Bonita J. Heffner

907 TAG
TSgt. Roger D. Miller

22 AF
Lt. Col. Walter T. Crawford
Lt. Col. Gregory A. Brooks
Lt. Col. Bernard H. Burgess
Lt. Col. William Caldwell
Lt. Col. Walter T. Crawford
Lt. Col. Terry H. Messer
Lt. Col. Brian F. Muskus
Lt. Col. Jackie L. Oehme
Lt. Col. William L. Schaefer
Lt. Col. Harry S. Staufield
Lt. Col. Jeffery W. Whisenhunt
Maj. Gregory A. Bricker
Maj. William J. Brown
Maj. William B. Carroll
Maj. Tommy J. Coulon
Maj. Frederick Crossman
Maj. Charles R. Davis
Maj. William J. Dougherty
Maj. Broughton B. Fox
Maj. Richard Holloman
Maj. Stephen Kernstock
Maj. Gordon K. Lemaire
Maj. Kenneth Maurig
Maj. Lowell P. Mattingly
Maj. Ronald D. Munson
Maj. James A. O'Dell
Maj. Nils R. Olson
Maj. Scott T. Quinn
Maj. Mark D. Rafferty
Maj. Joel R. Ross
Maj. Leroy D. Sutton, Jr.
Maj. Bruce C. Wilbers
Capt. William H. Bahn
Capt. Zachary E. Bailey
Capt. Karl L. Elders
Capt. Michael R. Hendricks
Capt. James S. Maple
Capt. Paul A. McDaniel
Capt. Brian W. Miller
Capt. Keith E. Morgan
Capt. N. Lee Nuckolls
Capt. Larry R. Price
Capt. Steven J. Sumner
Capt. Benjamin H. Trosmal, Jr.
Capt. Joseph P. Widmayer
CMSgt. Danny J. Brittain
CMSgt. Ronald G. Chastain
SMSgt. Lawrence R. Hogue
SMSgt. Johnny R. Moore
SMSgt. Robert E. Paynter
SMSgt. Robert M. Turner
SMSgt. Jerry W. Harris
SMSgt. Chester B. Ruddell
MSgt. Jerry Anderson
MSgt. Michael E. Bruce
MSgt. Paul Buege
MSgt. Phillip Combs
MSgt. Jerry L. McFarling
MSgt. Earl Richard, Jr.
TSgt. John D. Bloomhert
TSgt. Ted A. Canisio
TSgt. James E. Comer
TSgt. Theodore J. Condo
TSgt. John F. Conlee
TSgt. Theodore E. Driscoll
TSgt. Stephen M. Gambert
TSgt. William A. Gilbreath
TSgt. Ronald Hamilton
TSgt. John F. Jackson
TSgt. Ronald A. Leonard
TSgt. Stephen Sapp
TSgt. Larry S. Whipple
TSgt. Mark A. Winkler
SSgt. Joel A. Braxton
SSgt. James D. Crockett
SSgt. Nibaldo Cruz
SSgt. Curtis A. Flagal
SSgt. Edward L. Jackymack, Jr.
SSgt. Carl N. Jones
SSgt. James D. Koown
SSgt. Michael E. Mansmart
SSgt. Robert B. Pickering
SSgt. Randal K. Riddell
SSgt. Angel E. Rosado, Jr.
SSgt. Selwyn L. Samuels
SSgt. Samuel E. Stanson, III.
SSgt. Nancy G. West

440 TAW
Lt. Col. Roger Eberhardt
Lt. Col. John Elfers
Lt. Col. Henry Liebeck
Lt. Col. Thomas Nowicki
Lt. Col. Richard Spieler
Maj. Kim Anderson
Maj. George Berens
Maj. James Cramer
Maj. Eric Furness
Maj. Dennis Holmes
Maj. Larry Jamison
Maj. James Longley
Maj. Robert Marks
Maj. Dale Marsden
Maj. Kim Newman
Maj. Steven O'Connor
Maj. Theodore Riendeau
Maj. Harry Schonau
Maj. Gary Schroeder
Maj. Robert Sorensen
Maj. Mell Stober
Maj. James Webb
Maj. Douglas Weingram
Maj. Kevin Wentworth
Maj. Michael Wolonluk
Capt. Michael Byers
Capt. Max Dolin Pia
Capt. Tony Durant
Capt. Richard Ruth
Capt. Steven Stubbe
SMSgt. Dennis Meyer
SMSgt. Gerald Green
MSgt. Alan Anderson
MSgt. Theodore Bannanthe
MSgt. Jeffrey Baxter
MSgt. Edward Dorsch
MSgt. Roger Erickson
MSgt. Robert Hagenaas
TSgt. Carmon Francher
TSgt. Steven Haigler
TSgt. Paul Lagerman
TSgt. Peter Magnasco
TSgt. James Martin
TSgt. Lawrence Newville
TSgt. Mark Stever
TSgt. Dale Taylor
TSgt. Phillip Tejak

13 MAS
Lt. Col. David C. McClure
Maj. Frank A. Brandeberry
Maj. Andrew A. Fairlie
Maj. Steven R. Knudsen
Capt. Kellie M. Waddell

60 OMS
TSgt. Ricardo A. Curiel
TSgt. Barry R. Cutliff
TSgt. Dellin A. Reyes
SSgt. William M. Caesar
SSgt. Steven E. Hatfield

75 MAS
SMSgt. Terrance E. Biggers
SMSgt. Elliott I. Davis
SMSgt. Guillermo A. Hernandez
SMSgt. Patrick R. McClinchen
SMSgt. Joseph J. Ogrod
SMSgt. Virgil W. Redmon, Jr.
MSgt. Joseph F. Bourey
MSgt. J. D. Floyd
MSgt. Joseph C. Hafferon, Jr.
MSgt. John W. Hasch
MSgt. Thomas P. Kelley
MSgt. Robert E. Krumpin
MSgt. Phillip H. Sanborn
TSgt. John R. Casey, Jr.
TSgt. Robert P. Gildart
TSgt. Michael Hays
TSgt. Charles J. McKinnell, Jr.
TSgt. Howard E. Lewis, II.
TSgt. Arthur J. Mitchell
TSgt. Gary M. Moore
TSgt. Michael J. Rano
TSgt. Michael J. Ryano
TSgt. Lawrence T. Siak
TSgt. Fredrick H. Wiehe
SSgt. Theresa M. Estes
SSgt. John T. Werner

374 TAW
Lt. Col. Roger D. Bashett

313 MAS
Lt. Col. Gilbert C. Schmidt
Maj. Douglas H. Barrett
Maj. David Bauer
Maj. Scott M. Bigham
Maj. James F. Blackman
Maj. Paul W. Boettcher
Maj. Christopher D. Clark
Maj. Ward C. Conger
Maj. James C. Durkin
Maj. George L. Fletcher
Maj. Robert S. Graves
Maj. Thomas R. Hedrick
Maj. Thomas L. Henry
Maj. Gary E. Hudson
Maj. Danny D. Huey
Maj. Lindsey G. Johnston
Maj. Keith A. Littlefield
Maj. Roger S. Parsons
Maj. Robert E. Patterson
Maj. Larry W. Peterson
Maj. Roger K. Profit
Maj. Ross C. Robb
Maj. Frederick M. Russell
Maj. Richard P. Snellings
Maj. Jon E. Steiner
Maj. William D. Tate, Jr.
Maj. William E. Thies
Maj. William E. Thomlinson
Maj. Robert L. Washburn
Maj. Gregory L. Whiting
Maj. Alan R. Wolfe
Maj. Joseph P. Zmora
Capt. Robert J. Breidenbach
Capt. David C. Carbaugh
Capt. Gene P. Eberline
Capt. Willard D. Griffith, Jr.
Capt. Paul E. Kent
Capt. Diane E. Little
Capt. Lon D. Lowe
Capt. Dayton M. Maltby
Capt. Erik L. Mathiesen
Capt. Rodney A. Mattmiller
Capt. James J. Muscatell, Jr.
Capt. Christopher H. Paulson
Capt. Juan D. Rangel
Capt. Alan J. Reichel
Capt. Larry D. Ridgeway
Capt. Steven L. Ruth
Capt. Kenneth F. Schlabaher
SMSgt. Arthur A. Lambright
MSgt. Michael D. Adams
MSgt. Donald E. Bowen
MSgt. Ralph E. Cabeceiras
MSgt. Danny L. Flynn
MSgt. Bruce L. Hall
MSgt. Robert M. Kosola
MSgt. Robert E. Lancaster
MSgt. Gerald L. Nickel
MSgt. Paul A. Pritchard
MSgt. Dean B. Ramsey
MSgt. Arnold L. Sander
MSgt. John C. Schwartz
MSgt. William R. Wallace
MSgt. Teresa M. Webster
MSgt. Steven L. Weideman
MSgt. Brian E. Zar
TSgt. Arthur H. Brueggen
TSgt. John Burke
TSgt. Emil L. Grassia
TSgt. Duncan B. Lickey
TSgt. Jerry B. McVicar
TSgt. Terrance L. Philen
TSgt. Douglas T. Pugh
TSgt. Roger K. Rettig
SSgt. Robert J. Bertsch
SSgt. John R. Howard
SSgt. Monica L. Linz
SSgt. William T. Martin
SSgt. Kartin M. Mustapha
SSgt. Peter A. Nielsen

Ranks and units are those at time of award. ★

QUICKSTOPPERS

"PORCELAIN" PROBLEMS

Except for a single loud thump heard halfway into the trip, the remaining one and one half hour of this Navy C-9B flight was quiet and uneventful. All indications were normal. During post-flight inspection, the crew noticed a 6-ft blue stain on the port fuselage on the forward lavatory service panel. Additionally, the service panel compartment was packed with blue ice. After removing the ice, the crew discovered an extremely worn drain outlet seal. Further investigation also revealed a dented compressor blade on Number 1 engine.

A worn or defective lavatory drain outlet seal could allow waste water to leak into the service panel compartment and onto the fuselage. If water accumulates and freezes, it may dislodge and cause considerable damage to Number 1 engine. Location of the forward lavatory panel relative to the location of Number 1 engine makes this occurrence quite probable. In this case, two unrelated events conspired to damage the Number 1 engine compressor blades. The first, obviously, was the worn drain outlet seal, although this alone should not have caused the leak. Second, further investigation revealed the lavatory waste tank drain valve (which allows water to be drained from the tank) had been jammed open by paper towels. These two seemingly minor failures could have caused loss of an engine and a serious emergency.

UNEXPECTED LIFT!

The pilot of a C-141 weighing more than 300,000 lbs applied extra power to taxi for departure. Exhaust blast from the aircraft caused a private Cessna 182, parked approximatetly 100 ft behind the '141, to lose its mooring and be lifted on its right wingtip. Two alert individuals on the ground witnessed the incident, ran toward the C-141, and motioned the crew to cut power and stop. As soon as power was reduced to idle, the Cessna rolled back on its landing gear. End result: Dents and scratches on wing surface and a broken right wing tip. Could have been worse! Watch it!

After Deadlines

ASSOCIATE EDITOR NEEDED--The world's best flight safety magazine--*TMF*--of course--needs **YOU.** Reporting dates anytime after January 1989. We're looking for at least one, maybe two, rated captains or majors. A background in safety, journalism, or public relations is helpful but not absolute. If interested (how could you not be?) write to: Supervising Editor, *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, Illinois 62225-5101; or call AV 576-3534/5542.

TRANSPLANT GIVES A C-141 NEW LIFE--A transcontinental aircraft wing transplant operation begun in California and ending in Japan will give a badly-damaged MAC C-141 a new life. The *donor*: a damaged C-141 from Travis AFB, Calif; the *recipient*: A crash-damaged C-141 at Marine Corps AS, Iwakuni, Japan. A 17-member 2955th Combat Logistics Support Squadron team from Robins AFB, Georgia, removed the wing from the Travis aircraft. A similar team will reattach the wing to the C-141 in Japan. The removal project and loading on a C-5 took over a month. As soon as that installation is complete the "renewed" aircraft will be flown to Robins AFB.

"FREQUENT FLYER" TRANSPORT PLANE--Military Airlift Command workhorse. According to recent flight statistics, MAC's fleet of 273 Lockheed C-141s logged more than 8 million flight hours. That's 4 billion miles or approximately the equivalent of more than *8,000* C-141 round trips to the moon. The venerable "workhorse" joined MAC's inventory in 1965 and is the first jet aircraft specifically designed, engineered, and built to meet military standards as a troop and cargo carrier. The aircraft immediately became the mainstay of MAC's transoceanic mission. Congratulations to this "old friend."

MAC-GAINED RESERVE AND GUARD UNITS JOIN IN A FIREFIGHTING EFFORT--In what seems to be a yearly event, some MAC-gained Reserve and Guard units fought fires with C-130s equipped with modular airborne firefighting systems. MAC active duty crews also flew Army troops to the "Big Sky" state to help contain blazes that were burning for weeks. Units flying the retardent-dropping missions are the 153 TAG, ANG; the 943 TAG, (AFRES); and the 146 TAW, (ANG.) . These crews fly at an altitude of 150 ft for maximum accuracy and fire retardent coverage. The systems on the aircraft can discharge 3,000 gallons of retardant in one delivery, covering an area 150-ft wide by 2,000-ft long. Six C-141s from 62 MAW, and one C-141 from 63 MAW, hauled Army troops from Ft. Lewis, Wash., to firefighting sites in Montana. The crews flew 13 missions, delivering more than 1,000 folks and some 30 vehicles, mostly jeeps.

U. S. GPO: 1988-554-015/80011

TOUCH N GO

Cheap manicure!